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ARCHEOLOGY OF THE DEAD RAVEN SITE

Barbara A. Walling
and
Richard A. Thompson

With a contribution by
Kathleen Heath

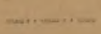
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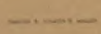
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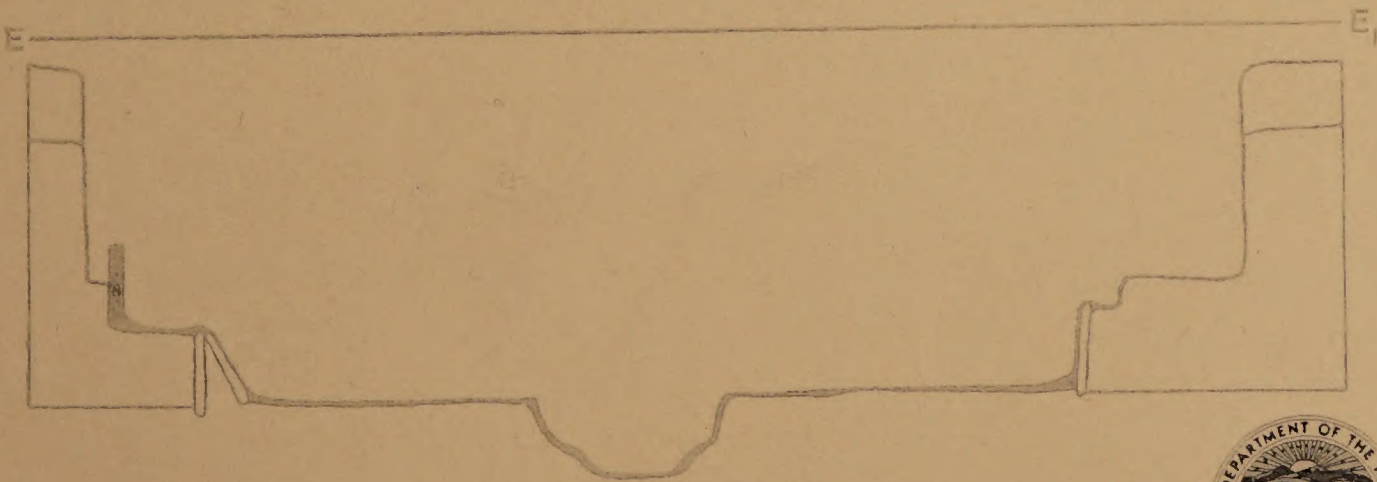


Clay Floor Edge



Approx. Limits

Scale: 0 1m 2m



Utah Cultural Resource Series No. 26
Grand Staircase-Escalante National Monument
Special Publication No. 2



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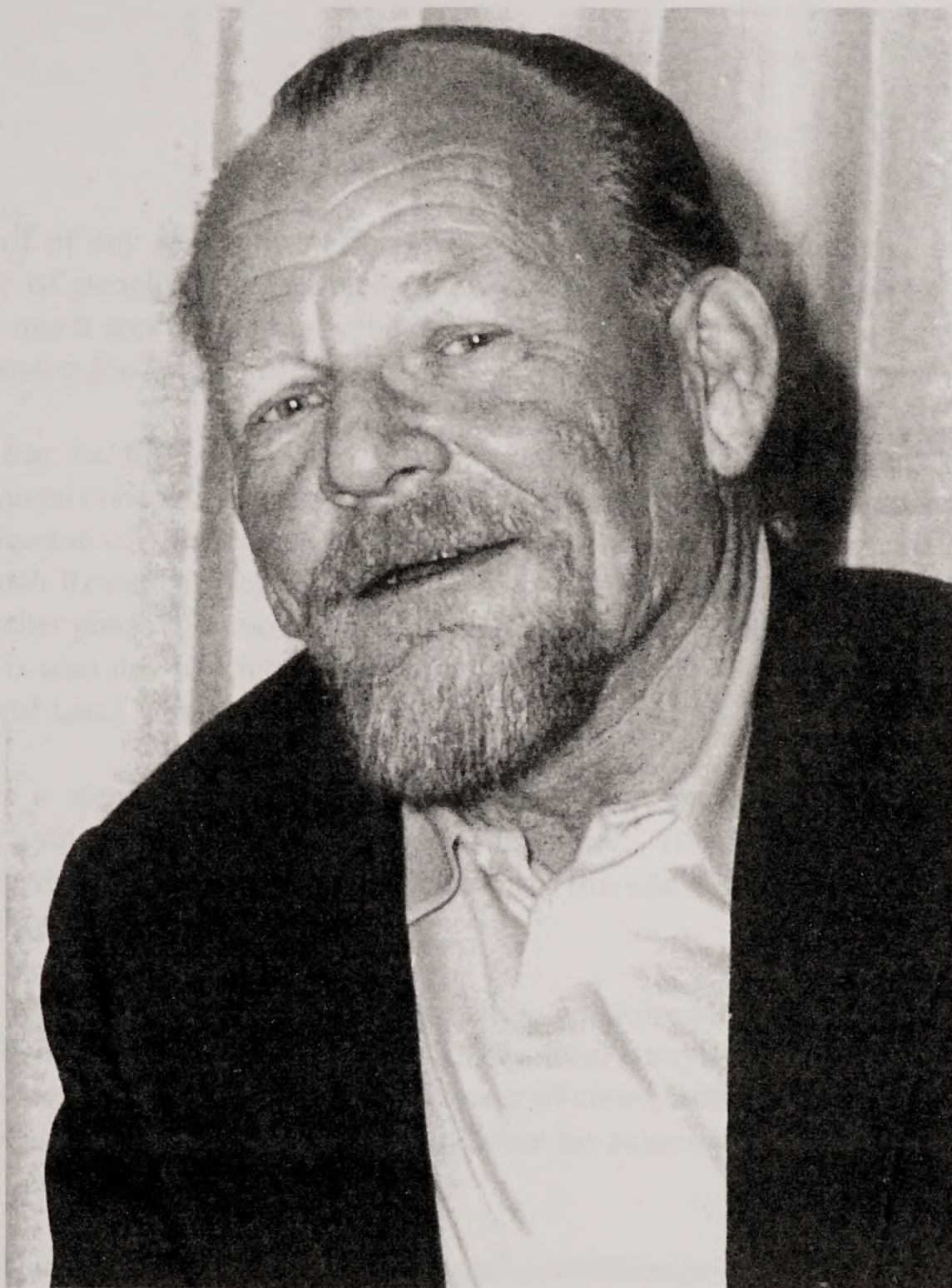


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With a contribution by
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Utah Cultural Resource Series No. 26
Grand Staircase-Escalante National Monument
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United States Department of the Interior
Bureau of Land Management
Salt Lake City, Utah
2004



Richard A. "Doc" Thompson

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The staff of any excavation effort inevitably becomes obligated to a substantial number of people, and the present project has been no exception. First, of course, much appreciation must be expressed to the members of the Kane County Commission for funding the work.

There can be little question but what our greatest debt is to our long-term professional colleagues, Gardiner F. Dalley, archeologist for the Cedar City District of the Bureau of Land Management and to Douglas A McFadden, archeologist for the Kanab Resource Area of the same District. Their assistance in this project is but another phase in a most beneficial mutual series of cooperative endeavors. A thanks is also due to Richard Fike, until recently State Archeologist of the Utah Bureau of Land Management.

We owe a special debt to Kathy Heath for her prompt competence and skill in dealing with the macrofossils studied in this project. Her commitment to the work is a most valuable asset to our understanding of this site and the other sites on which she has worked with us.

Finally we wish to express our appreciation, an expression long overdue, for the very substantial support we have always had from Barry Frank who has worked as a crew chief, logistic director and as a leader of crews with which we have worked. It is our hope that he will be able to continue his association with us well into the future.

*Note The editors also wish to thank and acknowledge Camille Ensle of Grand Staircase-Escalante National Monument Headquarters who worked on the digital imaging and formatting for this updated version of the original manuscript.

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PREFACE

Although the Dead Raven excavation report was written over 15 years ago, it is a solid and useful contribution to our knowledge of the prehistory of Johnson Canyon and the Grand Staircase region. The excavations were carried out as mitigation for an upgrade of the Johnson Canyon road in 1986. At the time it was excavated, the Dead Raven Site was administered by the Kanab Field Office. Due to lack of publishing funds the report remained in the realm of “gray literature”. In 1996 the upper portion of Johnson Canyon became part of the newly established Grand Staircase - Escalante National Monument. Along with this new status came the opportunity to publish the report as a GSENM Special Publication within the long-established Utah Cultural Resource Series.

Archeological excavations at the Dead Raven site were typical of investigations conducted under the auspices of the Cedar City District cultural resource program from the late 1970's until 1996 when Grand Staircase – Escalante National Monument (GSENM) was established. During that twenty year period, a program of conducting small-scale excavations of threatened and damaged sites contributed substantially to our knowledge of local prehistory. Although these situations were the unfortunate result of errant bulldozers, looted sites, eroded structures and, in the case of Dead Raven, a conflict with the route of a historic road, we did not consider these situations to be “salvage” archeology rather, they were *opportunities* to conduct research and unravel the prehistory of the area. This “parts and pieces” approach to data recovery, focused on developing the sequence of architectural types, their ceramic and stone tool associations, and especially enhancing the woefully inadequate chronological record of the area. Dr. Richard Thompson was a key partner, and absolutely critical, to this long term effort.

The Museum of Southern Utah University (SUU), created solely by the efforts of Richard Thompson, was and still is the primary repository for artifact collections found on public lands in southwest Utah including what is now Grand Staircase – Escalante National Monument. In conjunction with the occasional excavation opportunities, numerous intensive inventories were carried out, both on and off, what is now the Monument. These surveys provided information on site distribution and prehistoric settlement in which we could consider the excavation data. By 1996 over 500 sites had been recorded as part of this effort.

In light of what appeared to be a hopeless situation of looting and illicit collecting, large samples of ceramics from these inventories were collected. Because of his long-standing interest in ceramic analysis, particularly their identification and distribution, Thompson accepted these collections with no regard for the effort and personal expense it took to accession and maintain them. They now constitute an invaluable research collection for future study.

Since this is, at least in part, a tribute to Ric Thompson - and to Barbara Frank - it could in no way be complete without mention of the “Field School.” While Ric offered a field class in archeology from just about day one of his tenure at College of Southern Utah (later Southern Utah State College, now Southern Utah University), the CSU/SUSC/SUU Field School, as an intensive, off-campus experience in a camp situation, began in 1969 in Tuweep Valley, Grand Canyon National Monument, Arizona. While the focus of that effort was the excavation of a large, surprisingly

early Basketmaker site, extensive inventories of the valley and surrounding areas were also carried out. It was also in this context that Ric met Georgia Beth Smith, his to-be partner in marriage and the field school operation for 26 years.

In 1979, following the beginning of an extensive inventory of the mesa, the field school moved to Little Creek "Mountain," Washington County, Utah. This large, mesa-like bench is the first step on the Grand Staircase and a great repository of upland Virgin Anasazi sites, apparently spanning the entire period of Formative occupation in southwestern Utah. Ric ran the school there from a semi-permanent camp in an unchained grove of P/J, virtually until his death in 1995. The torch was quickly picked up, however, by Barbara, who was by then an experienced director and very able excavator, and by Georgia Beth, who kept up the administrative aspects and provided impetus, continuity, and support.

Whatever else "Doc" (as he was affectionately called by his students) may have been, he was a dedicated teacher and educator, and the field school was his great passion. He kept it afloat notwithstanding some strained and lean years, as well as through some serious personal difficulties. He ran the school not unlike boot camp, but always as a very special learning experience, whether on site, doing inventory, or in evening labs and seminars - formal or informal. Over the years, hundreds of young women and men participated in this exceptional program. Not all, of course, saw the Light and chose to follow the Path - but many good ones did, and they have served the profession well. Very few of the balance would report other than an extremely significant experience, both academically and personally. Barbara and Georgia and their staff have done an outstanding job of maintaining excellence and staying the course, but Ric's influence and presence continues to be pervasive.

As alluded to above, it has been a singular pleasure to assist Barbara in the preparation of this volume for publication. Particularly it is pleasing and satisfying to pay a little homage to a significant mentor, as well as recognize a pair of co-conspirators in the definition and selling of a strong, temporally deep, and well-developed local Anasazi tradition. That brings us, however, to the one task in editing that was not all that enjoyable, since Ric would probably not have approved. This revolves around a pretty basic issue: what do we call said local manifestation?

Aikens' initially coined "Virgin Branch of the Kayenta Anasazi" is neither short, pithy, nor, for a number of reasons, presently acceptable. Thompson suggested a clean break with Aikens' terminology and, again for various reasons, offered "Western Anasazi" as an appropriate name. Ric was pretty adamant, to the point of publishing a journal so-named. Some picked "Western", some, including the undersigned, did not, preferring instead to drop the "Branch of the Kayenta" from Aikens' nomenclature to form a nice, succinct "Virgin Anasazi." We prefer this for several reasons, among them that Western is locationally nebulous, Virgin calls to mind a particular and very appropriate geographic area- as well as considerable historical context- and, perhaps actually the most telling, that Western Anasazi was previously used in the literature, describing a much different culture area than we have in mind.

Since the passing of Ric and Bob Euler, combined with Margaret Lyneis' retirement, the mantle of Keepers of the Orthodoxy of Local Anasazi Archeological Lore has passed, albeit by default,

to the writers here, along with Barbara Frank. Many others have made, and are currently making, significant contributions, but are in-and-out folk. We are resident and we know the secret handshakes. Therefore, without a lot of further fuss, review, or justification, we submit that it is time to lose the duality of terminology and go, henceforth, with "Virgin Anasazi." We have edited this volume to that end, and will be pleased to treat others in a similar manner, should they come along.

Gardiner Dalley, Cedar City Field Office

Douglas McFadden, Grand Staircase – Escalante National Monument

INTRODUCTION

Project History

The Dead Raven site, 42Ka2667, is a Virgin Anasazi habitation and storage complex situated in the NE ¼, NW ¼, NW ¼ of Section 25, T41S, R5W in Kane County, Utah (Fig. 1). The site is located on land administered by the Kanab Resource Area of the Bureau of Land Management's (BLM) Cedar City District. At an elevation of 5720 ft, it lies on the west side of Johnson Canyon just west of Johnson Creek some 12 miles north of the mouth of the canyon (Fig. 2). Previous road construction had run directly across the site.

Faced with plans by the Kane County Commission to widen and pave an additional four miles of the road, including the portion that ran across the site in question, an archeological survey was required. In May of 1984, Dr. Richard A. Thompson of Intersearch conducted an inventory which identified four sites. BLM archeologists subsequently determined that 42Ka2667, later known as the Dead Raven site, was the only one that would be impacted by the project. Archeologists Gardiner Dalley and Douglas McFadden tested the site between February 4 and 7 of 1986. The tests demonstrated that there were substantial structural remains within the right-of-way which made it mandatory that some mitigation be undertaken.

The Kane County Commission awarded an excavation contract to International Learning and Research, Inc. (Intersearch). Excavations were authorized by Bureau of Land Management ARPA Permit No. 86-UT-57638. Work began on November 4, 1986 and continued through November 19. A total of 110 worker days, including some volunteer labor, was invested in the field work. The weather was cool and skies remained clear except for a single day of rain which forced a work stoppage. Unfortunately, the intensity of that single rain partially eroded Pithouse 2 before it could be completely photographed.

The Principle Investigator was Dr. Richard A. Thompson, President of Intersearch. Barbara A. Walling, also of Intersearch, directed the field work. Crew members included Ivan Benn, Barry Frank, Malan Richards, Richard Skougard, and Stoney Wall. With the exception of Skougard, the crew were members of the Paiute Tribe of Utah. BLM archeologists Gardiner Dalley and Douglas McFadden also assisted during much of the project.

The Environmental Setting

Geography and Topography. Johnson Canyon, draining from north to south, is a topographic feature formed by Johnson Wash which cuts down through the southern edge of the Skutumpah terrace and along the White Cliffs and through the Shinarump Cliffs just north of the Arizona border. Access to the site is obtained by driving on U.S. 89 some 10 miles east of Kanab to the point where the Johnson Canyon road meets the highway. Turning up the road, the Dead Raven

site is 12 miles north of the highway.

The Dead Raven site is located in the southern portion of the Grand Staircase section of the Colorado Plateau physiographic . The Grand Staircase is composed of a series of tiered cliff lines that rise from the Grand Canyon to the High Plateaus of Utah. The lowest are the Shinarump Cliffs (Triassic) followed in succession by the Vermilion Cliffs (Triassic), White Cliffs (Jurassic), Gray Cliffs (Cretaceous), and the Pink Cliffs (Tertiary). (Stokes 1986)

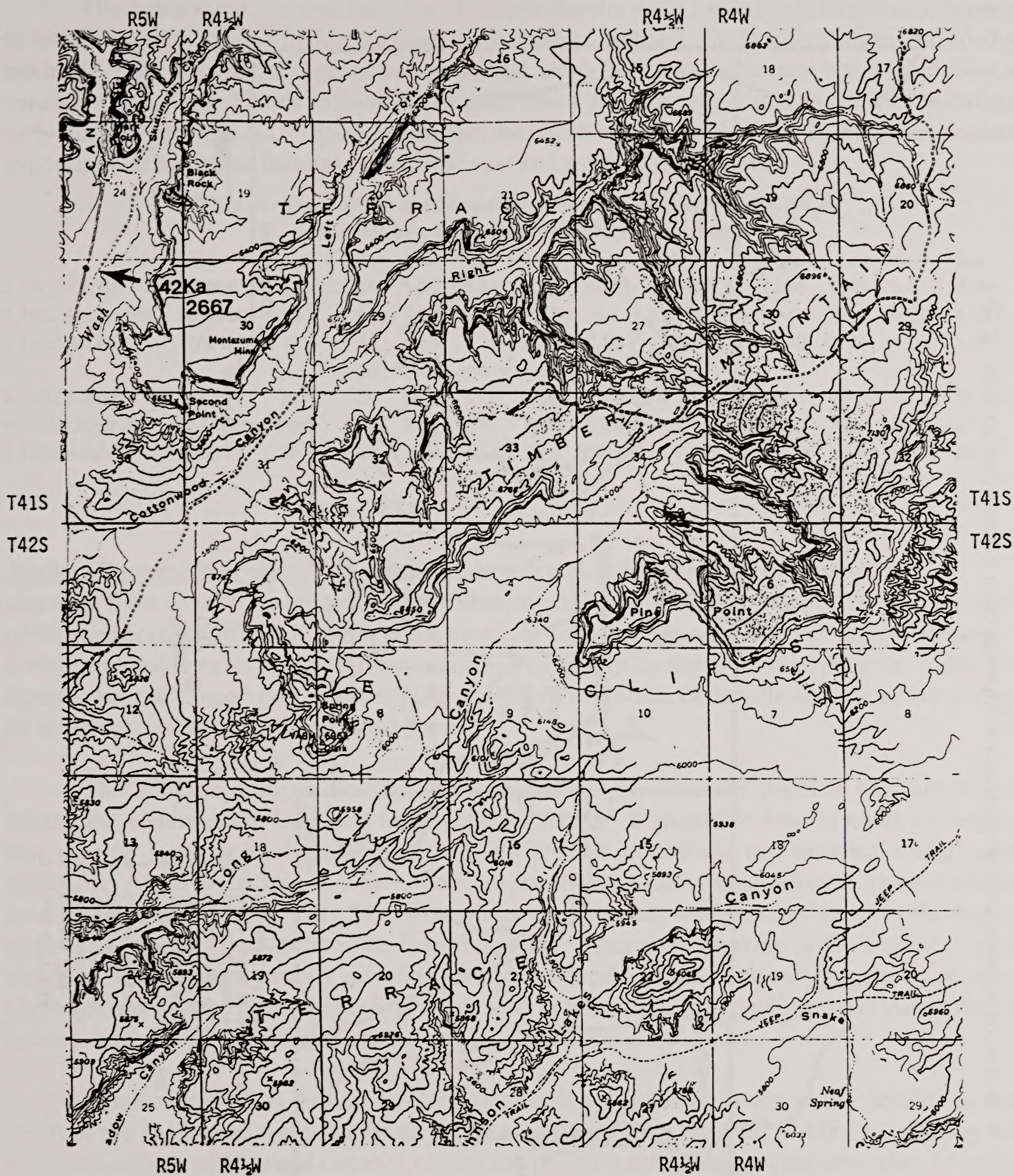
The Dead Raven site is located in the upper reaches of Johnson Canyon just below the Skutumpah Terrace. Only the upper reaches of Johnson Canyon cut through the Skutumpah Terrace, but the site is located in this part of the canyon. The Skutumpah terrace is bounded by the White Cliffs on the south, the Elkhart Cliffs on the west and on the north where, at an elevation of 7,000 feet, they merge with the low benches, escarpments and foothills of the Paunsaugunt Plateau. The Skutumpah Terrace is a broad, flat feature, cut by southerly flowing streams and covered by a juniper/pinon forest, sagebrush, and stands of scrub oak (Gregory 1950).

The greater part of Johnson Canyon cuts through the Wygaret Terrace, a broad bench which tilts to the north between the Vermilion Cliffs on the south and the White Cliffs on the north. The intercanion areas "...are characterized by low broad-based buttes of bare rock, rounded ridges, and gentle slopes, in places coated with soil, and on which here and there sand from the washes has been deposited as dunes." (Gregory 1948:218). Only a few south-flowing watercourses, such as Johnson, Deer Springs, and Kaibab Creeks along with the Paria River, cut through the Vermilion Cliffs forming flat- floored canyons suitable for agriculture.

Johnson Creek heads at roughly 9,000 ft., southeast of Alton, Utah on the Paunsaugunt Plateau. The creek breaks through the Vermilion Cliffs at about 5,200 ft. and flows southwest to join Kanab Creek south of Fredonia. Today Johnson Creek is only a reliable water source in its upper reaches but, historically, and probably prehistorically, it was a perennial stream throughout its entire length. Springs in the southern reaches of the canyon augment the stream flow and historically allowed for the settlement of Johnson.

The Dead Raven site is located on the western terrace of Johnson Wash, approximately 400 m from the deeply entrenched watercourse which runs through a wide, flat, open area of the canyon. The wash has cut 20 m below the surrounding ground, the result of stream degradation which has occurred in the last 100 years. Similar entrenching was reported along Kanab Creek during the 1880's when a channel 60 ft. deep and 70 ft. wide was formed along a 15 mile stretch, destroying adjacent farm and meadowland (Gregory 1963:13).

The site rests at an elevation of 5,720 ft. at a point where the canyon is 3,500 m wide. The site area is on a 1 to 5 degree sand dune slope. It is some 1,350 m east of the steep sandstone cliffs which rise an average 600 ft. above the canyon floor and are a part of the White Cliffs formation. The site covers a 7000 square meter area and the vegetation cover is composed primarily of sagebrush, rabbitbush, with some juniper and pinon touching the western edge.



MM-15 USGS Johnson (NE $\frac{1}{4}$) 15' (1954)

Fig. 1.

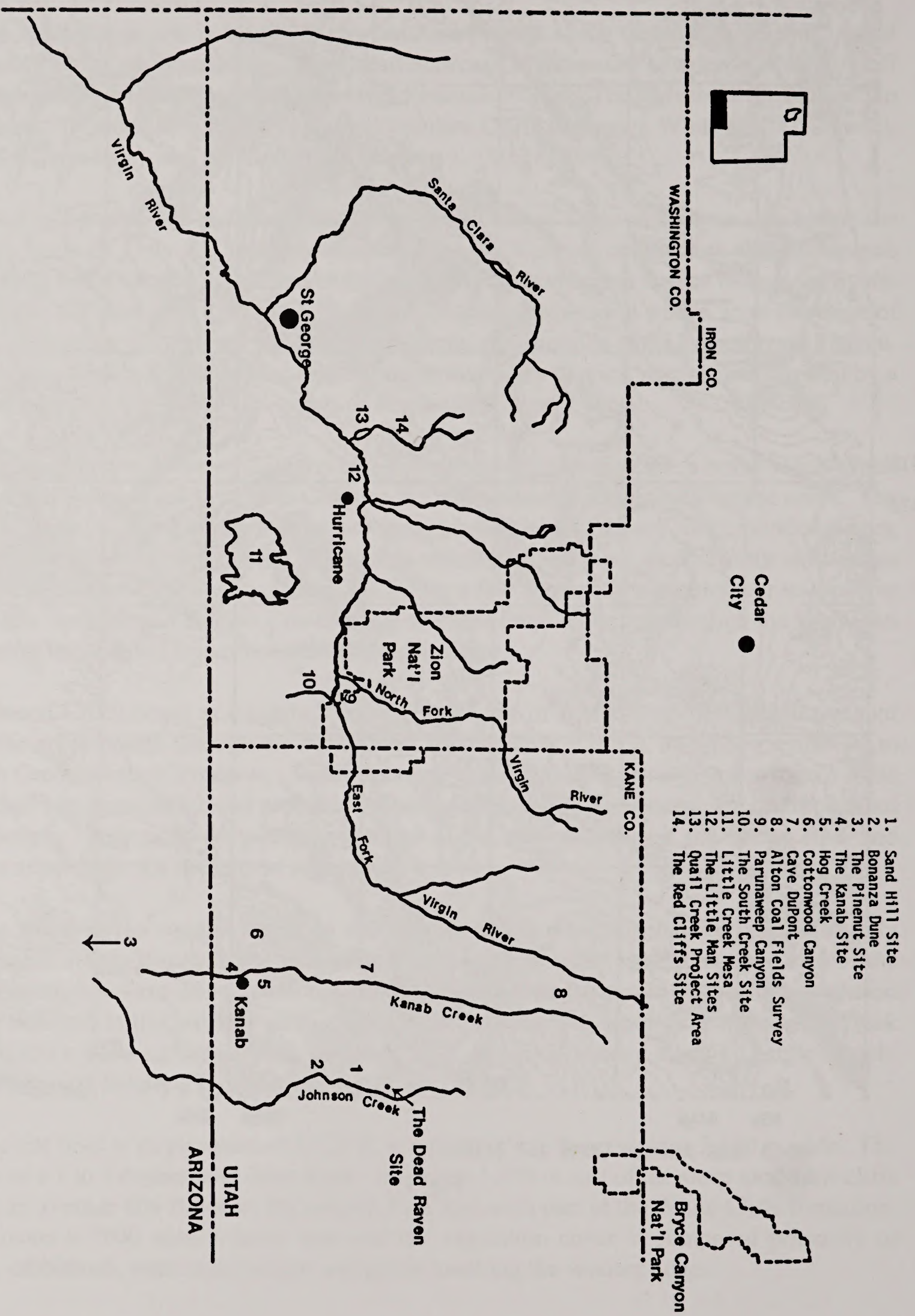


Fig. 2. Map of southwestern Utah showing archeological sites referred to in text.

The Johnson canyon road runs directly across the site and it has exposed structural evidence as well as a darkly stained midden stratum in the western cutbank. Surface indications included a moderate lithic, ceramic, and ground stone scatter, along with some structural stone rubble and a vandalized structure. Sherds collected during the initial inventory suggested an occupation during early Pueblo II prior to A.D. 1050. In addition, the backhoe test conducted by BLM archaeologists exposed more structural features on both the east and west sides of the road.

Table 1. Precipitation and Temperature Distribution in Surrounding Areas

		Mean Monthly and Annual Precipitation in Inches*												
		Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1922-1962 Kanab	(4985')	1.62	1.45	1.35	0.81	0.62	0.38	0.89	1.37	0.88	0.96	0.93	1.4	12.66
1928-1962 Orderville	(5440')	1.77	1.82	1.43	1.01	0.77	0.5	0.88	1.3	1.2	1.14	1.09	1.53	14.44
1912-1962 Alton	(7040')	1.76	1.69	1.58	1.16	0.87	0.55	1.48	1.74	1.42	1.24	1.05	1.66	16.2
		Mean Monthly and Annual Temperatures in F												
1931-1962 Kanab	(4985')	34.6	39	44.2	51.6	60	69.2	75.7	73.7	67.1	56.5	44.7	36.4	54.4
1951-1962 Orderville	(5440')	30.7	34.8	39.3	47	56.3	65.6	72.4	70.3	63.1	52.7	40.7	32.7	50.4
1915-1962 Alton	(7040')	26.5	29.5	34	42.1	50.4	58.5	65.7	63.9	57.3	47.6	36.7	29.1	45.1

*Gregory 1963:27

Available Natural Resources. The terrain in the surrounding area produces variations in elevation from 6,600 ft. to the north on the Skutumpah Terrace, to an average 6,400 ft. at the top of the surrounding cliffs to 5,200 ft. at the mouth of Johnson Canyon. This variability produces a wide range of flora and fauna further intensified by highly localized weather patterns. Table #1 summarizes the temperature and precipitation records of Kanab, Orderville and Alton, towns that lie southwest, west and north of Dead Raven.

The Johnson Canyon area is characterized by precipitation patterns that are found throughout southwestern Utah and northwestern Arizona. It should be kept in mind, of course, that specific topographical features such as differences in altitude can exercise strong local variations. At the same time, however, there are four distinct seasons that account for total annual precipitation (Rykaszwski 1981:24). The winter precipitation which brings snow to the higher elevations generally results from the frontal activity of storms originating in the Gulf of Alaska which move in a south-easterly direction towards to Pacific Coast. The cyclonic action of these storms means that the moisture bearing winds tend to blow out of the southwest and this produces heavier amounts of precipitation on the western slopes of the mountains.

Summer rainfall is mainly the result of localized thundershowers which develop as the result of the passage of warm, moist air flowing northeast from the Gulf of Mexico. During the transition periods of May and October, closed low pressure cells pass over the area often bringing precipitation which can add significantly to the total annual rainfall. During all seasons the orographic patterns can create places of higher rainfall while other areas are rendered more arid by the rainshadow effect.

The climatic regime in the Johnson Canyon-Kanab area, with its orographic factors, produces a tendency to moist, cool winters and early springs which warm to intense heat and dryness by June. July and August are the hottest months, but localized thunderstorms provide some

moisture, although its distribution is often erratic. The annual precipitation in Kanab, where the elevation is 4,985 ft., averages 12.66 inches per year, ranging from 7.29 to 20.70 inches (Gregory 1963). An average of from 22 to 30 inches of snow falls in the Kanab area between October and March but it is primarily the snow-fed perennial streams originating on the Paunsaugunt Plateau which are critical to a consistent reliance on horticulture.

In the Kanab-Johnson Canyon area, temperatures range from an extreme of 106 degrees to a low of -20 degrees, producing an annual mean of 54.4 degrees. During July temperatures average 74.1 degrees while in January they drop to 32.3 degrees. This produces a range of 120 to 151 frost-free days during the year, although 140-150 days is average (Gregory 1948). Spring precipitation is usually sufficient for the preparation of fields but the general drought of April, May and June makes irrigation essential.

The alluvial soils along streams and river valleys are best suited for horticulture. Analysis shows that essential minerals are generally abundant although the lack of nitrogen and organic matter could have been critical limitations (Gregory 1950:33). This may, however, be a function of modern water control and may not reflect prehistoric limitations.

The Chinle Formation, which is exposed below the Vermilion Cliffs, must have provided a number of resources for the Anasazi as well as for other prehistoric populations. The Shinarump member of the upper Chinle is, itself, formed of two components. The higher member is the Shinarump Conglomerate which is composed of well-cemented, fine to coarse-grained tabular sandstone containing stone used for prehistoric structures. The lower Shinarump member consists of poorly sorted but well-cemented, streamworn gravel with occasional pieces of petrified wood.

The lower portion of the Chinle formation is a soft shale containing both petrified wood and jasper nodules. This member is exposed along the base of the Vermilion Cliffs where the stone, ranging from yellow to red, forms a valuable lithic resource (Walling and Thompson 1986a: 9). The jasper was used for flaked tools in the area of Johnson Canyon and Zion National Park as well as in the Virgin River valley to the west. A small exposure in Parunuweep Canyon (Walling and Thompson 1986b) and along the Virgin River below Hurricane also produced jasper nodules.

Streamworn quartzite cobbles were also available in the conglomerate gravels and alluvial deposits common to all of the canyons of the area. The Anasazi frequently used small cobbles for pounding tools and, in a few instances, flakes were struck from them. Larger cobbles were incorporated into structures along with sandstone cobbles from the upper Shinarump. Meanwhile, sandstone slabs and rocks were used in the manufacture of ground stone implements such as manos and metates.

The elevation of the Dead Raven site is 5,720 ft. which places it in the Cold Desert zone usually said to occupy land between 4,500 and 6,500 ft. It should be kept in mind, however, that the somewhat dissected nature of the terrain results in localized ecozones that have little regard for contour lines. The result is a series of diverse plant communities of biotic groups rather than well-defined vegetation zones.

The pygmy forest composed of pinon (Pinus edulis) and juniper (Juniperus osteosperma) dominates the adjacent uplands, canyon margins and the total area of the canyon north of the site. Understory and bottom land vegetation includes big sage (Artemisia tridentata), rabbit brush (Chrysothamnus nauseosus), blackbrush (Coleogyne ramosissimum), cliff rose (Cowania stansburiana) and Ephedra sp. The transitional zone is present on the cliff tops and north of the site. The zone includes mountain mahogany (Cercocarpus sp.), Gambel oak (Quercus gambelii), manzanita (Arctostaphylos sp.) serviceberry (Amelanchier utahensis), grasses and a few ponderosa pines (Pinus ponderosa).

The variable terrain of the Wygaret and Skutumpah Terraces, and the adjacent Paunsaugunt and Kaibab Plateaus, would appear to actually contribute to the persistence of variable plant communities resulting in an almost continuous abundance of natural vegetation. The winter months from December to late February and the summer months of June through early August are the only times when some plants are not blooming. Even in the summer months, however, some plants will continue to bloom at the higher altitudes of the Paunsaugunt Plateau.

In Kane and Washington Counties alone, 265 vertebrate and 1,125 invertebrate species have been identified. This includes 75 mammals, 150 birds, 15 lizards, 10 snakes, 7 amphibians, 8 fish, 20 snails, 100 arachnids, 5 crustaceans, and 1,000 insects (Gregory 1950:37).

Both large and small mammals probably formed the most important animal resources for the Anasazi. Other species in the animal kingdom were probably utilized, but their remains are not visible in the archeological record. A number of large animal species are also known in the archeological record even though they are now extinct in the area. This group includes the grizzly bear (Ursus horribilus), pronghorn antelope (Antilocapra americana), mountain sheep (Ovis canadensis), and the gray wolf (Canis lupis). It is also possible that buffalo (Bison bison) once inhabited the region as did the black bear (Ursus americanus).

Mammals still known to reside in the general site area include mule deer (Odocoileus hemionus), elk (Cervus elaphus), cougar (Felis concolor), coyote (Canis latrans), beaver (Castor canadensis), porcupine (Erethizon dorsatum), bobcat (Felis rufus), badger (Taxidea taxus), skunks (Mephitis mephitis and Spilogale gracilis), foxes (Vulpes vulpes, V. relox, V. macrotis, and Urocyon cinereoargenteus), weasel (Mustela fenata), jackrabbits (Lepus townsendii and L. californicus), and rabbits (Sylvilagus audobonii and S. nuttallii) (Schroeder 1955:37; Ransome 1981). Small mammals, including mice, packrats, gophers, squirrels, and chipmunks, are present in the area in numbers that are much greater than the counts for larger animals.

In the 1860's Mormon pioneers found Southern Paiutes growing crops along both Kanab and Johnson Creeks as well as on the Paria River (Gregory 1948:215). Pressure from early settlers eventually pushed the Paiute out of their traditional areas and they were placed on the Kaibab Reservation southwest of Kanab. In 1871, Mormon pioneers formed a community, Johnson City, in the canyon. Both the town and the canyon were named for the Johnson brothers who initiated the settlement (Woodbury 1950:18). The town was eventually abandoned due to the erratic stream behavior and entrenching which made farming impractical with existing technology. In a description of the history of the area it is stated that "Experience during 75 years of occupancy has

demonstrated that Kane County is "cattle country", generally unsuitable for farming or mining." (Gregory 1948:216). At the present time both farming and cattle ranching are actively practiced in the lower reaches of the canyon where springs help to provide reliable water sources.

Summary of Previous Research

Archeological research began in southwestern Utah in the 1870s but, for about 100 years, the work was sporadic and brief and, until the fourth quarter of the first century, it was poorly reported when it was reported at all.

Edward Palmer appears to have launched the first archeological investigation in the region in 1875 when he opened a site some four miles west of St. George along Santa Clara Creek. He then went on to excavate a cave in Johnson Canyon, a few miles east of Kanab, in 1877. He described his "finds" in two short papers (1876 and 1880). Both publications make it clear that his primary concern was the collection of artifacts.

Over a quarter of a century later, Neil Judd visited southwestern Utah and northwestern Arizona during the summers between 1915 and 1922, although during some of that time he divided his season with work in northern and central Utah as well. While he left short but incisive accounts of many of his observations, his records of the excavation of kivas in Cottonwood canyon northeast of Kanab have not been found in the Smithsonian files, although the photographs are available (Douglas McFadden, personal communication). In 1920, Jesse L. Nusbaum, a gifted archeologist in his own right, excavated the Basketmaker Cave DuPont eight miles northwest of Kanab (Nusbaum, 1922; Kidder and Guernsey 1922).

A number of slab-lined cists, flexed Basketmaker burials, and numerous perishable artifacts came from Cave DuPont which has been determined to be of the Basketmaker II period. A well-preserved cache of seed corn demonstrated knowledge of horticulture at this early date although there is no way to assess its importance.

Early in the 1930s, archeological investigations began in the Zion Park and Virgin River areas just west of the Park. In 1930, 1931, and 1932, Joseph E. Spencer, a doctoral candidate in geography at the University of California at Berkeley, surveyed the Virgin River area from the mouth of Parunuweap canyon to the Arizona line. Doing this work on weekend breaks during his study of modern use of the St. George Basin, Spencer accumulated a ceramic collection which would eventually provide Harold Colton with the core of materials for the creation of a ceramic typology for the Arizona Strip and the neighboring areas of Utah and Nevada (Colton 1952).

From late 1933 through the fall of 1934, the Civil Works Administration funded archeological research in Zion National Park. Ben Wetherill directed the work with the assistance of Elmer R. Smith. A survey of portions of the park was begun by concentrating in the area running seven miles up Parunuweap canyon to the eastern boundary of the park (Fig. 2). A total of 33 Anasazi sites were recorded and the interpretation was later verified by tests and excavations.

Both Wetherill and Smith produced short reports of the work. Unfortunately, fire destroyed a large part of Wetherill's records and it was only much later that Albert H. Schroeder (1955) managed to pull together the remaining data and add to them the survey records of Park Naturalist Russell K. Grater, as well as some areas of his own investigations.

Wetherill and Smith tested or excavated 12 sites with an occupation range from Basketmaker III through Pueblo II. Site types included rockshelters, storage cists, unit pueblos, and single family habitation and storage features. A rockshelter with slab-and-juniper-lined cists was the only site with a definite Basketmaker III affiliation. The balance of the sites documented the Pueblo occupation in Parunuweap canyon.

Noting the excavation of an apparent kiva built in early Pueblo II times, Schroeder (1955) sought to trace the architectural tradition through time. He particularly noted that the pithouse remained in use throughout the Anasazi occupation of the region:

"In short, the tradition of individual houses was basic, and unit pueblos were resorted to only, but not always, when sufficient arable land was available and perhaps other favorable factors were present." (Schroeder 1955:23)

Schroeder concluded that the Anasazi of the Parunuweap area were characterized by low population densities which received or accepted minimal influence from surrounding Anasazi population of Kayenta or Mesa Verde affiliation.

Also in 1932, Julian Steward surveyed the reach of the Paria River from Cannonville to the northern edge of the Paria Plateau. During the course of this work he made ceramic collections which were also used by Colton in the development of his ceramic taxonomy. About this same time, Ben Wetherill recorded sites in the Mount Trumbull and upper Tuweep areas of the Arizona Strip and then went into the Grand Gulch region farther west to record additional sites. During the mid 1930s, Elmer Smith, by then on the faculty of the University of Utah, recorded a few sites in southwestern Utah but his work was seriously hampered by limited funds and the difficulties of travel.

When Jesse D. Jennings formally established a statewide archeological survey at the University of Utah in 1949, one of the earliest projects sent Jack Rudy and Robert Stirland into Washington County to inventory sites for two Bureau of Reclamation reservoir projects near the towns of Gunlock and Virgin (Fig. 2). The survey went beyond the project areas pursuant to instructions that they should give some attention to the problem of relationship of the Puebloan peoples of the Virgin River area with the rest of the southwest (Rudy and Stirland 1950).

Rudy and Stirland recorded 73 sites. In addition to the two reservoir areas, they visited parts of the Kolob Plateau, Little Creek Mesa, Berry Springs, the mouth of Ash and LaVerkin Creeks in the Virgin River Gorge, and the Land Hill area near Ivins. Virtually all of the sites actually tested were, however, in the reservoir project areas. Field work led Rudy and Stirland to conclude that the Virgin River area witnessed a limited occupation during the Basketmaker III and Pueblo I times with the most intensive occupation coming during the Pueblo II period.

In 1962 and 1963 Melvin Aikens (1965) directed the excavation of three sites in the St. George area, two within Zion National Park (Fig. 3), and two in Johnson Canyon, some 15 miles northeast of Kanab in Kane County. These seven excavations were an extension of the Glen Canyon project in the sense that the work was done at some distance from the primary project area for purposes of securing cultural comparisons.

The two Johnson Canyon excavations, at Bonanza Dune and Sand Hill, are just south of the Dead Raven site. Bonanza Dune was a complex habitation and storage site located on a large dune formed above the talus on the west side of Johnson Canyon. The dune continued to build either during the occupation or at intervals between occupations. There were six stratigraphically identified occupations involving 21 structures. Of this number, 11 were semi-subterranean pithouses, three semi-subterranean storage structures and a kiva.

The very limited number of artifacts on structure floors implied planned abandonments while the presence of corn was good evidence for the practice of horticulture. Deer, mountain sheep and cottontail rabbits dominated the faunal collection, while 99% of all recovered ceramics were Virgin Series sherds indicating a middle to late Pueblo II occupation.

The Sand Hill site is less than a quarter mile south of the Dead Raven site. Sand Hill is located on a deflated dune well up the terrace slope west of Johnson Creek. The limited excavation exposed 10 storage features. The ceramic collection was dominated by plain wares which might be construed as an indication that this was primarily a storage site in use, apparently, in late Pueblo II. The storage units represented a variety of construction techniques including vertically set wall slabs, coursed masonry, and clay-lined pits. The structural variety may indicate use by different groups.

His two years of excavation prompted Aikens to examine the issue raised by Judd and Nusbaum concerning the nature of the cultural connections between the Kayenta Anasazi in the east and the Puebloan peoples living in the general Virgin River area as well as in the surrounding regions. The result was the publication of Aikens' Virgin-Kayenta Cultural Relationships (1966) which still remains one of the most successful attempts to synthesize the position of the so-called Virgin branch peoples in the prehistory of the southwest. Given the limited nature of the data available to him in the mid-1960s, Aikens' effort was a major tour de force. While it is becoming increasingly apparent that information more recently acquired is going to necessitate revision of some of Aikens' interpretations, this in no way diminishes the importance of his contribution which will continue to give direction to Virgin Anasazi research for many years to come.

A new thrust appeared in the archeological research of southwestern Utah when the Cedar City District of the Bureau of Land management obtained a District Archeologist in 1975 and then added a Kanab Resource Area archeologist in 1976. These two professionals have surveyed thousands of acres of government land since 1976 and they have also found opportunities to conduct a number of excavation projects. Much of the information the BLM has accumulated remains in the survey files but these are readily accessible to other professionals while the two archeologists have always been willing to share their information with other archeologists involved in relevant

work.

Water development projects have generated much archeological field work since the 1970s. Surveys, conducted by Hall (1970) for the Dixie Reclamation Project, and by Thompson (1978) for the LaVerkin Springs Project, have revealed an extensive Pueblo I to late Pueblo II occupation in the region (Fig. 2). The Quail Creek Reservoir Project (Walling et al. 1986), located on a tributary of the Virgin River some five miles west of Hurricane, has been one of the largest projects undertaken in the southwestern part of the state (Fig. 2). A total of 45 sites were excavated or tested. The work produced limited evidence of a late Basketmaker III occupation which was followed by a fairly continuous use of the area during Pueblo I and Pueblo II. There is also evidence of sporadic Southern Paiute utilization of the basin.

In 1980, a small site, the Kanab site, located on the west side of Kanab Creek about one mile south of the town of Kanab, was excavated by Nickens and Associates (Fig. 2). Two occupation levels were identified and C-14 dates supported the artifactual and architectural evidence. The lower portion of the site was dated at A.D. 520 \pm 120 years. This level lacked architectural features although a small amount of lithic debitage, an Elko Corner-notched point and some ground stone tools were found. The evidence suggests a Basketmaker II or III occupation.

The second occupation was represented by a number of architectural features and two radiocarbon dates, A.D. 980 \pm 120 years and A.D. 1150 \pm 120 years. The structures included a large pithouse with an encircling bench and an antechamber, three storage cists, and four "work patios". Ceramics were dominated by North Creek Gray, a utility ware of the Virgin Series, and St. George Black-on-gray indicating an early Pueblo II occupation. The identified faunal remains were dominated by mule deer, pronghorn antelope, mountain sheep, cottontail rabbits and black-tailed jackrabbits. Macrofossil and pollen evidence indicate that a wide range of wild plants, as well as cultivated corn, were used by the occupants of the site.

Also in 1980 the Gnatmare site, located approximately 30 miles east of Johnson Canyon on Cottonwood Creek, was excavated by the University of Utah (Metcalf 1982). A pithouse exhibiting two distinct occupation levels and a square masonry room were the only architectural features exposed. Charcoal from the earlier occupation level in the pithouse produced a date of AD 970 \pm 75, while a sample from the later level was assayed at AD 1115 \pm 65. The dates suggest sporadic occupation of the site through Pueblo II while ceramics and projectile points, as well as structural form, argue the closest link is with the Kayenta Anasazi.

The Red Cliffs site (Dalley and McFadden 1985) is located just over a mile upstream above the northern boundary of the Quail Creek project. This site produced extensive storage facilities and more limited evidence of habitation during two apparently separate occupations. The first of these was Basketmaker III/Pueblo I, while the second was early Pueblo II.

The work at Red Cliffs appears to have demonstrated an architectural progression from semi-subterranean storage cists to surface storage rooms and from a vague and discontinuous alignment of these features to a continuous one (Dalley and McFadden 1985:159). A number of questions dealing with environmental adaptations were also addressed. Among others was the

question concerned with an apparent lack of significant exploitation of wild plant and animal resources in this lowland riverine site as compared with such use sites located in higher country.

On the Virgin River, some three miles upstream from the mouth of Quail Creek, Dalley and McFadden excavated four small sites collectively known as the "Little Man" sites (Fig. 2). The sites were dug with some help from students at Southern Utah University and Brigham Young University. The sites rested on a spit of land formed by a gooseneck of the river. The work produced small storage and habitation units built and used by Virgin Anasazi during Pueblo I and early Pueblo II times (Dalley and McFadden 1985:26).

Little Creek Mountain, a mesa located some 15 miles southeast of Hurricane in Washington County, has been the subject of archeological investigations since the fall of 1978. The data collected in this area promises to shed light on cold desert adaptations (Fig. 2). An intensive systematic survey has thus far covered about 60% of the mesa's 30 square miles with something over 500 sites recorded thus far (Heid 1979, 1982). In twenty years, the Southern Utah University Archeological Field School has opened nine sites (Frank and Thompson 1995, 1995a; Thompson 1980, 1981; Walling and Thompson 1991, 1992, 1993; Wise 1982, n.d.) that have produced evidence of occupation from Pueblo I through Late Pueblo II. Continued work on this project offers the prospect of a substantial increment to understanding the Virgin Anasazi presence in the region.

Southern Utah University has also worked on a large late Pueblo II site in Colorado City, Arizona from 1990 through 1995, under joint agreements both with the municipality and the Arizona Strip District of the Arizona Bureau of Land Management. The site included a kiva and an extensive series of storage rooms with some habitation units representing at least six periods of occupation during the late Pueblo II period. Significant information recovered from this site included evidence of outside contacts through the recovery of three major intrusive ceramic forms. A dendrochronological date from a burned beam recovered from the roof of the kiva indicates a construction date of about A.D. 1150.

During the early 1980s, a small excavation project was completed by BLM archeologists at 42Ka2147 in Johnson Canyon some 6.5 miles south of Dead Raven. The site proved to be a small, single component storage and habitation facility situated in a sand dune. Features included a pithouse, three slab-lined storage cists, a clay pit, and a badly decomposed occupation surface. All features represented a Basketmaker III occupation. Ceramics were dominated by Mesquite Gray while a single Elko corner-notched point was also found. The bone collection contained a number of split *Artiodactyla* metapodial awls and metapodials in the early stage of being prepared for longitudinal splitting (McFadden personal communication).

The Hog Creek dune site, 1.8 miles north of Kanab on the north bank of the stream, revealed two burials, four single hearths, part of a large pithouse, a midden area, and an amorphous deposit of ash and jacal. Carbon dates include one at 580 B.C. +/- 110 from a sample associated with Burial 2, A.D. 170 +/- 60 from a midden sample, A.D. 270 +/- 130 Hearth 1, and A.D. 410 +/- 60 and A.D. 510 +/- 50 from Structure 1.

The authors (Schleisman and Neilson 1988:199-120) felt that the dates demonstrate sporadic use of the site from the latter part of the Late Archaic into Basketmaker II while ceramic evidence suggests a limited Pueblo I or early Pueblo II use in the upper levels. The pithouse, ascribed to Basketmaker II, appeared to have been circular and lined with upright slabs, but the floor did not appear to have been prepared. A slab-lined bin had been constructed along its southeastern arc. Faunal remains included desert cottontail, black-tailed jackrabbit, and mule deer, while flotation analysis demonstrates the presence of corn.

Most recently, an extensive Basketmaker III habitation and storage site, 42Ws326, was excavated by Brigham Young University just north of State Route 9 between the towns of Virgin and Rockville in Washington County. The work represents only the second extensive excavation of a Basketmaker II to III site in the Virgin Anasazi area. (The first was the Little Jug site in the Tuweep area of the Grand Canyon National Park in Mohave County, Arizona). At 42Ws326, the structures included three pithouses associated with a series of large, slab-lined cists on a terrace which overlooks the Virgin River to the south.

The South Creek site is a small, early Pueblo II habitation and storage site found less than 2 miles southwest of Zion National Park (Walling and Thompson 1986). Excavations revealed a circular pithouse lacking a bench, two storage cists, and a small, three room block of surface storage rooms. The faunal collection indicates that some mule deer was hunted and that its bone was utilized by the residents of the site.

Later in 1986 Abajo Archaeology excavated the Virgin Anasazi Pinenut site in the southeastern corner of that of Mohave County, Arizona that lies north of the Grand Canyon (Westfall 1987). The site was a single family habitation and storage component that is thought to have been occupied three times. The first occupation came between A.D. 1050 and A.D. 1100 while two later occupations were seen as taking place between A.D. 1200 to A.D. 1250 or 1275. Structures included a pithouse, a small concentration of cists, and a room block consisting of storage and habitation elements. The initial habitation was the pithouse with later occupations occurring in the surface structures of the roomblock.

Pollen, flotation, and artifactual evidence argued a mixed subsistence strategy which relied on both wild and domestic plant foods. The author believes that the site was seasonally occupied in order to collect local food stuffs which were subsequently transported to a winter occupation site (Westfall 1987:182). The site was particularly interesting in that its dates lend support to the position of those who have argued for a Virgin Anasazi occupation of the area for at least a century after the accepted date of abandonment in A.D. 1150.

During the late summer and fall of 1986, the Museum of Northern Arizona surveyed 11,725 acres for the proposed Alton Coal Mine project (Fig. 2). The area is located south of Alton, a small town north of Johnson Canyon. The survey centered on the Skutumpah Terrace/Gray Cliffs area which lies between Rainbow Point in Bryce Canyon National Park and the upper reaches of Johnson Canyon with the elevation ranging between 6300 and 7400 ft. The area, which includes upper drainages for both Kanab and Johnson Creeks, is dominated by a pinyon/juniper forest.

The 87 prehistoric sites recorded produced evidence of the Late Archaic, the Virgin Anasazi, and the Southern Paiute. Most of the sites were lithic scatters showing evidence of bifacial thinning and projectile point technology, grinding slabs, manos, and large, unifacial chopping tools. While a few sherds were found, ceramics were generally scarce. Hearths and roasting pits were the most common structural features. The sites are thought to represent hunting and pine nut gathering locations and it is assumed that they were most heavily used by the Virgin Anasazi during Pueblo II.

The overview offered above shows that western Kane County has been an area of archeological research since the early Twentieth Century and that research in the broader Virgin Anasazi area has accelerated substantially in the last 15 years.

For some, Johnson Canyon is a controversial area in the issue of the determination of the boundary between the Kayenta and the Virgin Anasazi, although those who have worked in the canyon remain convinced it is well within the Virgin Anasazi tradition. It is possible that the cultural boundary may never be defined to everyone's satisfaction but the continued acquisition of archeological evidence from additional excavations will certainly further illuminate issues in chronology, settlement patterns, and changing subsistence strategies.

CULTURAL AFFILIATION AND DATING

The Dead Raven site is located within that portion of southern Utah which has traditionally been regarded as the home of the Virgin Branch of the Kayenta Anasazi. In recent years the term "Western* Anasazi" has been locally adopted by some to identify the Formative inhabitants of the area. This term is the result of an effort to distinguish the culture of the region as a homogeneous entity which, though related, differs significantly from the Kayenta "hearth" area of northeastern Arizona. (Thompson and Thompson 1983). (*Editor's note 2004 – Currently, the preferred convention is to drop "Branch of the Kayenta" and use "Virgin Anasazi." We have edited to that end – see the preface.)

The Virgin Anasazi are recognized as having once occupied a region that extends from a southern limit along the Grand Canyon of the Colorado to the higher elevations along the northern boundaries of the Washington and Kane Counties of Utah. There is evidence of an intensive occupation in the Moapa Valley of southern Nevada and sites have also been recorded in the Las Vegas Valley still further west. The eastern boundary of the Virgin Anasazi is a matter of considerable controversy. Some would establish it along Kanab Creek while others suggest that it extends as far east as the Kaiparowits Plateau (Thompson and Thompson 1983). It is evident that more work needs to be done in Kane County and along the northern Arizona area of Coconino County in order to obtain more specific data on the prehistoric populations of the region. Excavations in Johnson Canyon should be well suited to address some aspects of the problem.

The Virgin Anasazi occupation is characterized by a tendency to a general similarity in architecture, settlement patterns, and artifact technology, particularly in ceramics. There is

apparently a cultural homogeneity over a wide area which includes two distinct environmental zones described as the Hot Desert and the Cold Desert. The northern St. George Basin serves as a transitional zone between the two. This suggests that the Virgin Anasazi constituted a cultural tradition that was well-adapted to two major environmental zones.

The Hot Desert is found in extreme southwestern Utah as well as in southern Nevada at elevations between 1,000 and 1,500 feet. Archeological sites are generally concentrated along rivers and perennial streams which, in Utah, includes the Virgin and Santa Clara Rivers and Quail Creek. The cold Desert is found in southeastern Washington County, much of Kane County, and in Mohave County between 4,500 and 6,000 feet. Areas such as Little Creek Mountain of Washington County and the Tuweep region of Mohave County, Arizona (Thompson and Thompson 1978; Wise, n.d.) are typical of cold desert environments.

The identification of Virgin Anasazi sites in two major environmental zones argues that these populations were able to practice horticulture in a variety of situations. Sites in the arid Hot Desert were located in close proximity to perennial water sources suggesting that floodplain or other forms of irrigation must have been used by Formative populations. The sites of the Cold Desert, such as those on Little Creek Mesa, are not presently found near live water sources nor does there appear to have been prehistoric sources of water. The assumption is that, prehistorically, precipitation must have been adequate for raising crops. The Dead Raven site is a curiosity in that it is in the Cold Desert but lies near the banks of Johnson Creek which, prehistorically at least, was a perennial water course.

The Virgin Anasazi chronology is still in the process of being developed. The initial ceramic typology associated with the area was developed by Colton (1952) with the aid of ceramic collections made by J. E. Spencer and others in the early 1930's. Additional ceramic studies by Thompson in conjunction with his excavations and surveys in Tuweep and on Little Creek Mesa and his familiarity with other local archeological projects has allowed him to further develop the Virgin and Moapa ceramic series, which are generally analogous with the Tusayan series of the Kayenta Anasazi. Due to a paucity of published radiocarbon dates and the complete absence of a dendrochronological sequence for the region, much of the Virgin Anasazi chronology has been constructed by cross-dating local Virgin ceramic wares with the more fully dated Tsegi series. Until a radiocarbon sequence and/or dendrochronology for the Virgin Anasazi can be fully established, ceramic cross-dating is still the most commonly used dating method for archeologists working in the area. (Editors note 2004. A radiocarbon date based chronology, supported by a more limited tree-ring sequence has been developed since the above was written.)

In terms of architectural evidence and site settlement plans, a gradual and very general evolution of structure form and layout can be perceived in the culture area. Excavated and dated archeological sites of the Basketmaker period are few and far between in the region, but at least one in the Tuweep area has been documented (Thompson and Thompson 1978). Excavations at the Little Jug site exposed two shallow, basin-shaped, clay-floored pit structures and two isolated, unlined, bell-shaped storage cists, all of which have been ascribed to the Basketmaker II period. A suite of six carbon determinations from the pit structures yielded dates ranging from A.D. 100 to A.D. 340 (Thompson and Thompson 1978, 1983). Additional excavations at the Little Jug site

further suggest that the construction of subterranean slab-floored circular cists also began during the Basketmaker II period.

Evidence of a Basketmaker III occupation at the Little Jug site included a pithouse and an associated circular, semi-subterranean slab-lined storage cist. The pit structure was also semi-subterranean and circular, with a partly encircling bench and some interior slab lining where the fill was particularly soft and loose (Thompson and Thompson 1978, 1983). Evidence of a Basketmaker III 'ugly' pithouse at 42Ws387 in the Quail Creek Project area yielded two radiocarbon dates, 1310 \pm 60 B.P. (A.D.640) and 1160 \pm 60 B.P. (A.D. 790), suggesting a late Basketmaker or an early Pueblo I occupation. No associated storage structures were found at the site but ceramics recovered in floor contact suggest a Basketmaker III occupation for the quite crude pithouse (Walling, et al. 1986).

During the early Pueblo II period, unit pueblos, composed of habitation and storage rooms, began to appear in the archeological record. The form of the rooms, with coursed masonry upper walls originating behind the interior wall slabs. Eventually, these room units move to the surface and the structures are almost entirely composed of coursed masonry walls, though slab-lined rooms persist through the Pueblo II period, along with the pithouse as a habitation unit. By mid-Pueblo II, the pithouse is often connected to the room block, which also may have an exterior ramada attached to it. The pithouse is still circular, semi-subterranean, and often slab-lined, but benches are absent and masonry upper walls begin to appear as part of the structure. It also appears that some pit structures may have been used as kivas during Pueblo II. Such structures have been seen on Little Creek Mesa at 42Ws920 and at the Shunesburg Site in Parunuweap Canyon (Schroeder 1955).

Abandonment of the area by the Virgin Anasazi is demonstrable in the archeological record, but whether this involved an actual population movement or a gradual in situ abandonment of horticultural lifeways and the eventual disappearance of permanent settlements is still an open question. What is clear, however, is that the cultural attributes which distinguishes the archeologically defined Virgin Anasazi begins to disappear from the record during the 12th century. The exact end of the Formative in the region and the form in which it occurred is still unknown. One hypothesis suggests a gradual abandonment of horticulture as a visible food resource. This may have been partially due to environmental factors, such as a shift in precipitation patterns or an increase in regional aridity. In sum, these factors may have prompted the prehistoric inhabitants of the region to intensify existing foraging activities to supplement failing agricultural production and then intermittently sift back to hunting and foraging patterns when crops failed. Eventually, the foraging, hunting and gathering adaptation may have become the only viable lifestyle in the region.

The Dead Raven site produced three datable carbon specimens which yielded the following determinations:

Beta-23053	1690 \pm 80BP	A.D. 260	Workroom, Feature A Fill.
Beta-23054	1120 \pm 70BP	A.D. 830	Pithouse 1 Floor, SE $\frac{1}{4}$.
Beta-23055	1010 \pm 60 BP	A.D. 940	Pithouse 1 Hearth Fill.

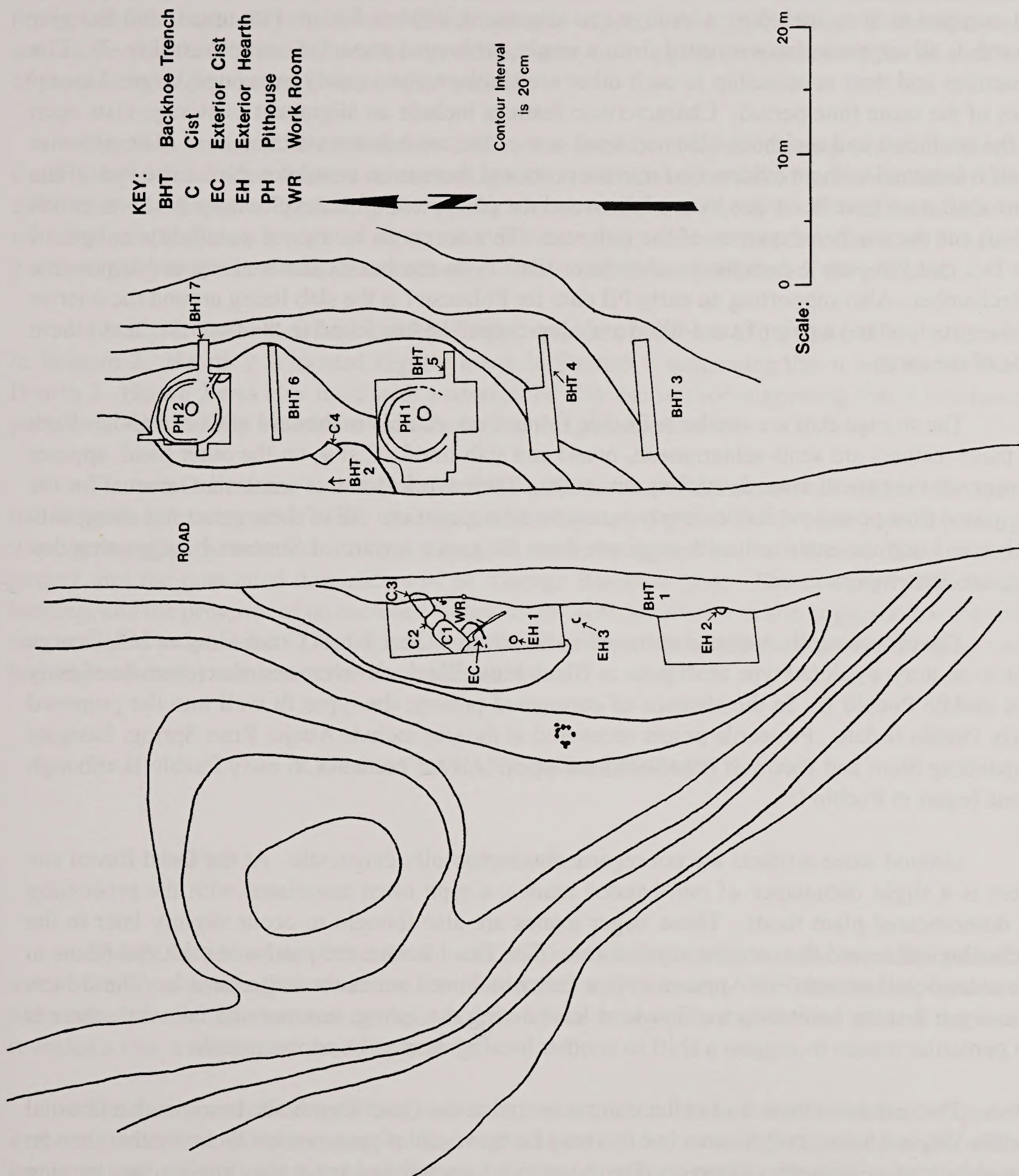


Fig. 3. Map of 42Ka2667, the Dead Raven Site.

The first date does not conform to either ceramic or architectural evidence from the site and must be considered aberrant. Taking into consideration the standard deviations for the other two dates, an occupation between A.D. 880 and 900 can be postulated while the A.D. 940 date is most closely in accord with other evidence of an early Pueblo II occupation. The basic early PII occupation area, including a storage cist alignment, a Work Room, Pithouse I, and Exterior Hearth 1, all appear to have resulted from a single, prolonged period of occupation (Fig. 3). The structures and their relationship to each other are similar to previously excavated Virgin Anasazi sites of the same time period. Characteristic features include an alignment of storage cists open to the southeast and a pithouse located southeast of the arc but not attached to it. The pithouse itself is benched with no evidence of interior posts and there is no ventilator shaft. The lack of the vent shaft may have been due to vandalism and the placement of the exploratory backhoe trench which cut the southeast quarter of the pithouse. This seems to be a good possibility in light of the fact that Pithouse 2 does have a ventilator shaft in its southeast quarter along with a possible antechamber. Also supporting an early PII date for Pithouse I is the slab lining around the interior of the structure and a pair of sand-filled and clay-capped basins found in the floor on the northern side of the room.

The storage cists are similar to Pueblo I structures, notably in the case of Cists 1 and 3. Both of these features are semi-subterranean, ovoid and slab-lined. Cist 4, on the other hand, appears to represent the trend towards surface structures. Their Work Room is somewhat unusual for the suggested time period but it does imply a year-round occupation. All of these structures along with Pithouse 1 and the exterior hearth originate from the upper surface of Stratum 1, suggesting that they are contemporaneous.

The ceramic collection is dominated by Shinarump Gray, North Creek Gray and St. George Black-on-gray, a painted type analogous to Black Mesa Black-on-white and characteristic of early and middle Pueblo II. In the absence of corrugated pottery, the types fit well into the proposed early Pueblo II date. Projectile points recovered at the site include Abajo, Rose Spring, Eastgate Expanding Stem and Parowan Basal-notched types. All are common to early Pueblo II although some began in Pueblo I.

Ground stone artifacts are not regarded as temporally diagnostic. At the Dead Raven site there is a slight dominance of two-handed manos, a type often associated with the processing of domesticated plant foods. These larger manos are also thought to occur slightly later in the archeological record than are the small forms. The Dead Raven site produced corn and beans in the macrofossil record (See Appendix A), a fact which well suites the larger manos. These facts also argue that the habitation was in use at least during the spring, summer and fall while there is no particular reason to suggest a shift to another locality during the winter months.

The extensive bone tool collection recovered at the Dead Raven site is somewhat unusual for the Virgin Anasazi culture area but this may be the result of preservation factors rather than an actual lack of prehistoric utilization. The quantity of unmodified bone also implies that hunting was an important food procurement strategy for this and other sites in the canyon.

Pithouse 2 also appears to have been the product of a late Pueblo I or an early Pueblo II

occupation. The surface of origin seems to have been at the top of Stratum 1, and , although it is a deeper room than Pithouse 1, this seems to have been more the result of the configuration of Stratum 1 than anything else. The features of Pithouse 2 are very similar to those of Pithouse 1. The comparable elements include the circular, semi-subterranean form of both rooms, partial slab lining, central hearth, clay-lined, sand-filled, and clay-capped basins in the floor. Differences are seen in the fact that Pithouse 2 produced evidence of a roof support system in the form of a series of posts found along the back wall of the bench.

Artifacts collected from Pithouse 2 fill were dominated by Shinarump plain and North Creek Gray sherds. Also found was a non-diagnostic collection of modified and unmodified bone and lithics. An Eastgate Expanding Stem point was also recovered from the fill but the context is too tenuous to associate it with the occupation of the structure. Excavators theorized that Pithouse 2 was actually associated with an unexcavated rubble mound just northeast of the pithouse.

Finally, Exterior Hearths 2 and 3 are both remnants of later use of the site and both originate in Stratum 2. Hearth 2 is located slightly lower in Stratum 2 suggesting that it was earlier than Hearth 3. Hearth 2 was clay lined with a contiguous clay use surface suggesting that it was more permanent feature than Hearth 3 which showed nothing in association.

The two C-14 dates, architecture, and the collected cultural materials all support the view that the principle occupation of the site occurred during early Pueblo II with some more transitory use coming slightly later but still prior to A.D. 1050, as argued by the absence of corrugated pottery and the continued domination of St. George Black-on-gray. The evidence of farming, hunting, and the presence of an enclosed "work room" with an interior hearth suggests that the site was occupied year around. Dead Raven doubtless also served as a base for seasonal foraging and hunting both in the canyon and on the mesas above.

EXCAVATION AND STRATIGRAPHY

Methods

The BLM test of the Dead Raven site involved cutting seven backhoe trenches on both sides of the road in an effort to determine its character and its extent. The trenches exposed two pithouses and a small structure on the east side of the road while exploration west of the road revealed a cist, a work room, and two hearths.

The Intersearch field crew began excavation at points where features had been exposed in the test trenches. Workers removed the vegetation from the western portion of the site while heavy equipment was used to remove the spoil dirt and Stratum 1 sterile material from the eastern area. The western part of the site lay at an average of one meter above the road. In the western area, excavation was limited to a strip 10 m wide and 25 m north to south. It was here that the test trench's western profile revealed a cist, the Work Room, and two hearths.

Prior to excavation, all trench profiles showing cultural features were diagrammed. Once profiles were completed, structural fill was removed by appropriate shovel and trowel excavation. The walls and floor features were, of course, exposed with a combination of trowels and brushes. In view of the sandy nature of the soil and the excavation experience of the crew, no midden was screened. The Field Director assumed responsibility for all written and diagrammatic records for the entire project. Recording methods employed the "F" or feature system developed by Jesse D. Jennings of the University of Utah for the Glen Canyon project. All cultural features and stratigraphic profiles were diagrammed to scale and photographed. A topographic map was also prepared and excavation units were plotted on it. Pollen and flotation samples were obtained from the floors of all structures, from various other features and strata, and from the modern surface. Ten flotation samples were processed and analyzed. The results of this study are published in Appendix A. Carbon samples were collected when found but no specimens suitable for dendrochronological dating were found.

Site Stratigraphy

All exploratory trenches exposed the site's stratigraphy but it was most clearly evident in the western profile of Trench 1. As in all other trenches, three strata could be identified. Excavators were, however, prevented from digging in the road because of heavy traffic. They were thus unable to establish a continuous profile between the western and eastern parts of the site. The simple nature of the strata and their clear similarities justified the assumption that they represented the same thing in both parts, however (Fig.4).

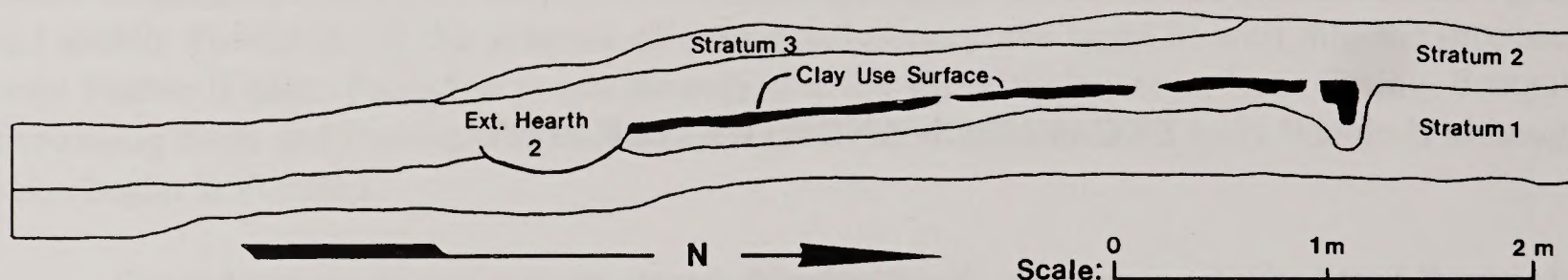


Fig. 4. Profile of southern end of Trench 1 showing Exterior Hearth 2.

Stratum 1. Stratum 1, the lowest level, was composed of moderately compacted brown/yellow sand. The upper surface of the stratum was found variously at 40 to 60 cm. below the surface (all depth measurements are given in relation to the existing ground surface) on the east. The top of Stratum 1 was found at 20 to 60 cm. on the west. The top of Stratum 1, which served as the surface of origin for most of the structural features, was found at deeper levels in the north and northeastern parts of the site. The stratum was much closer to the surface in the southern parts of the site since it was in the southern area that the modern dune slopes down rather abruptly.

Stratum 2. Stratum 2 was a sand layer lying directly on Stratum 1. It contained light to dark stains of ash and charcoal. The carbon stains and the concentration of cultural debris identified this as the cultural level and, as such, it defined the area of the site. In the western area, Stratum 2 varied

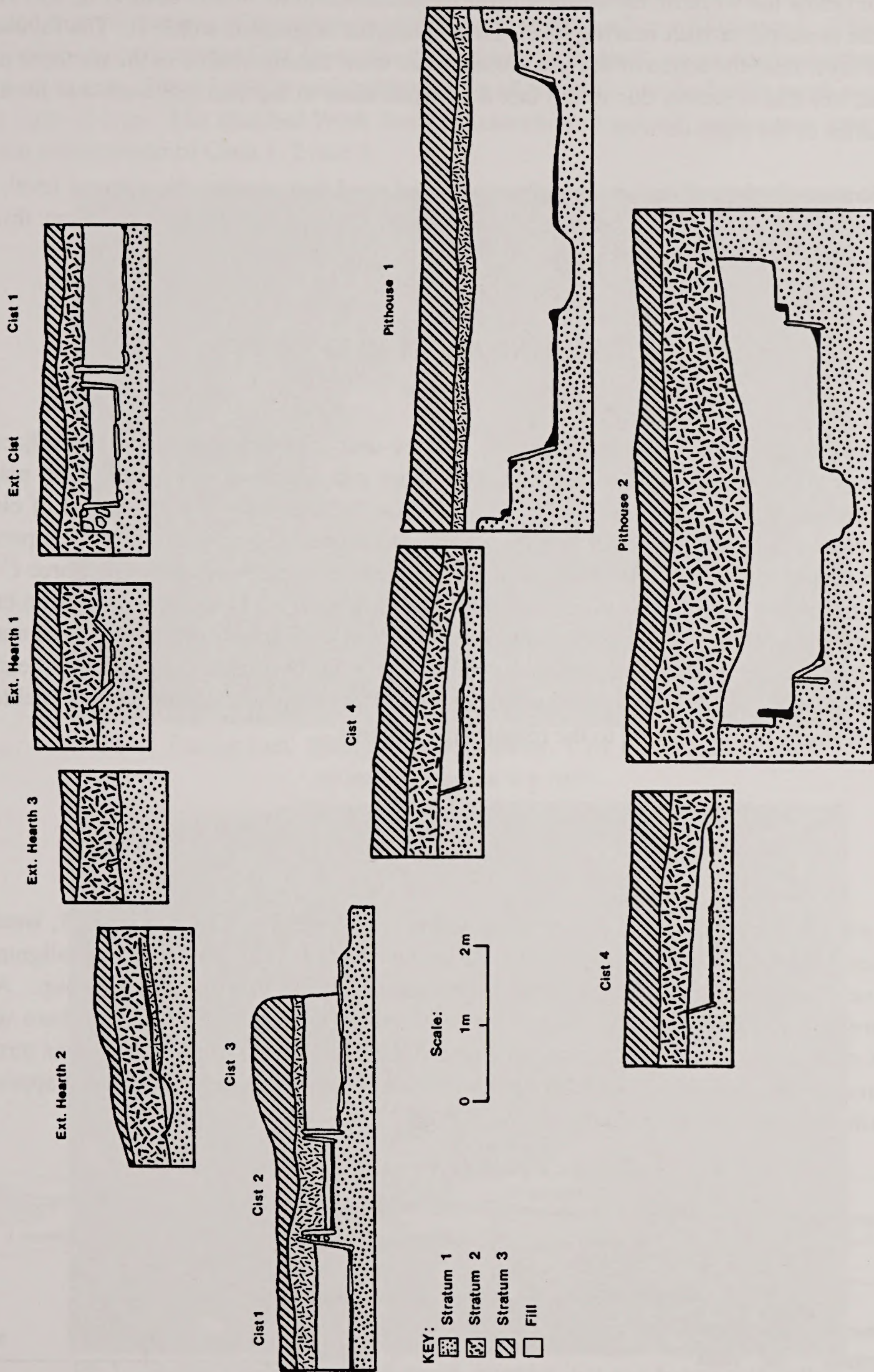


Fig. 5. Schematic Site Profile: composite of major stratigraphic and structural relationships.

from 10 to 35 cm. thick with an average thickness of 30 cm. In the eastern section, which lay as much as 1.5 m below the western, the cultural layer ranged from 40 to 50 cm. thick (Fig. 5). This stratum was the principle artifact bearing level and two hearths originated within it. The thinning of the cultural layer near the edges of the site proved to be most clearly visible in the northern and southern areas, but this is clearly due to the fact that exploration to the east and west was limited by the boundaries of the right-of-way.

Stratum 3. Stratum 3 was a thin, tan, loosely compacted sand that overlay the cultural level, as well as Stratum 1 in areas outside of the site. This uppermost layer ranged from 1 to 25 cm. thick, and it also contained some cultural material.

ARCHITECTURE AND RELATED FEATURES

Two large, semi-subterranean pithouses, a three-unit cist alignment with an adjacent Exterior Cist, a Work Room, an isolated cist, and three exterior hearths represent the major features exposed during the excavation (Fig. 3). Pithouse 1, along with the alignment of cists, related features and one of the exterior hearths - appear to represent a single, continuous period of occupation during early Pueblo II. Ceramics, architectural evidence and two of the three C-14 dates support the assumption. Pithouse 2 was similar to Pithouse 1 and may thus have been built during the same time period. Its location, however, combined with structural rubble to the north, suggest that it might be related to a separate occupation. The two remaining exterior hearths were later phenomena. The following discussion concentrates on the well-defined early Pueblo II occupational features before turning to the remaining elements.

The Cist Alignment

One part of the alignment was first identified in the western profile of Trench 1, west of the road, where Cist 3 was partially exposed by the original road cut (Fig. 6). The total alignment included three contiguous cists and a smaller cist attached to the exterior of the group. Also included were an appended Work Room and an exterior hearth (Fig.7, Pls. 1&2). There were further signs of structural elements in the road where it was impossible to dig. What was termed Cist 4, appeared on the east side of the road but it was included with this group because it appeared to line up with the other cists (Fig. 3).

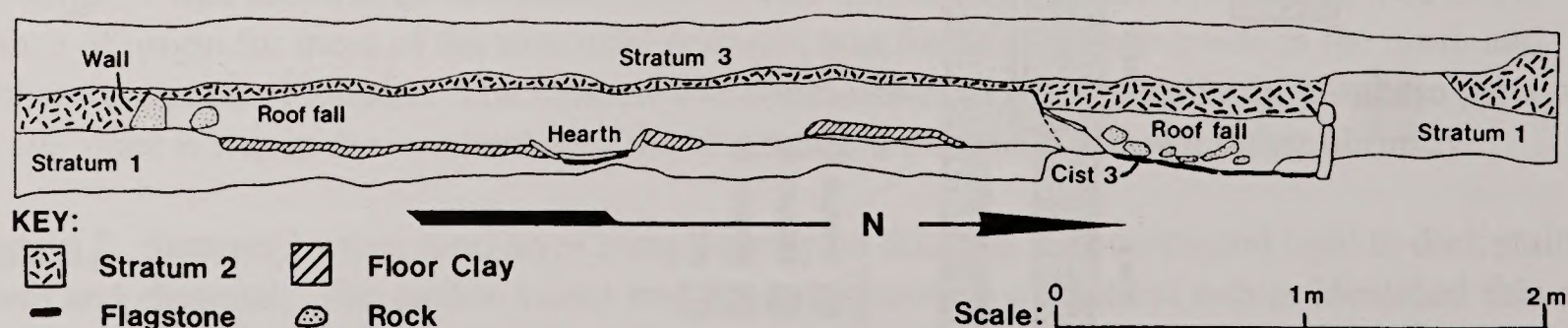


Fig. 6. Profile northern end Trench 1 showing Cist 3 and Work Room.

The western profile of Trench 1, as well as extramural excavations around major structures, indicated that all features of the alignment originated at the surface of Stratum 1. This produced a subjective impression that Cist 4 was the last element to be built, suggesting accretional growth from west to east. There is also a possibility that the alignment continued west-south-west, outside of the right-of-way. The attached Work Room, meanwhile, was built at the same time or shortly after the construction of Cists 1, 2 and 3.



Pl. 1. Facing east. Storage cist alignment. Cist 1 at right and work room fragment at top right.



Pl. 2. Facing southeast. Work room, exterior cist and Exterior Hearth 1 on far left.

The cist alignment and the Work Room appear to be related to Pithouse 1 and all of these features seemed to represent a single occupation during the early Pueblo II period. The stratigraphic evidence supported the view that the features were in use simultaneously and that they were subsequently destroyed by fire. The architecture, ceramics, and C-14 dates all support the proposition of an early Pueblo II occupation.

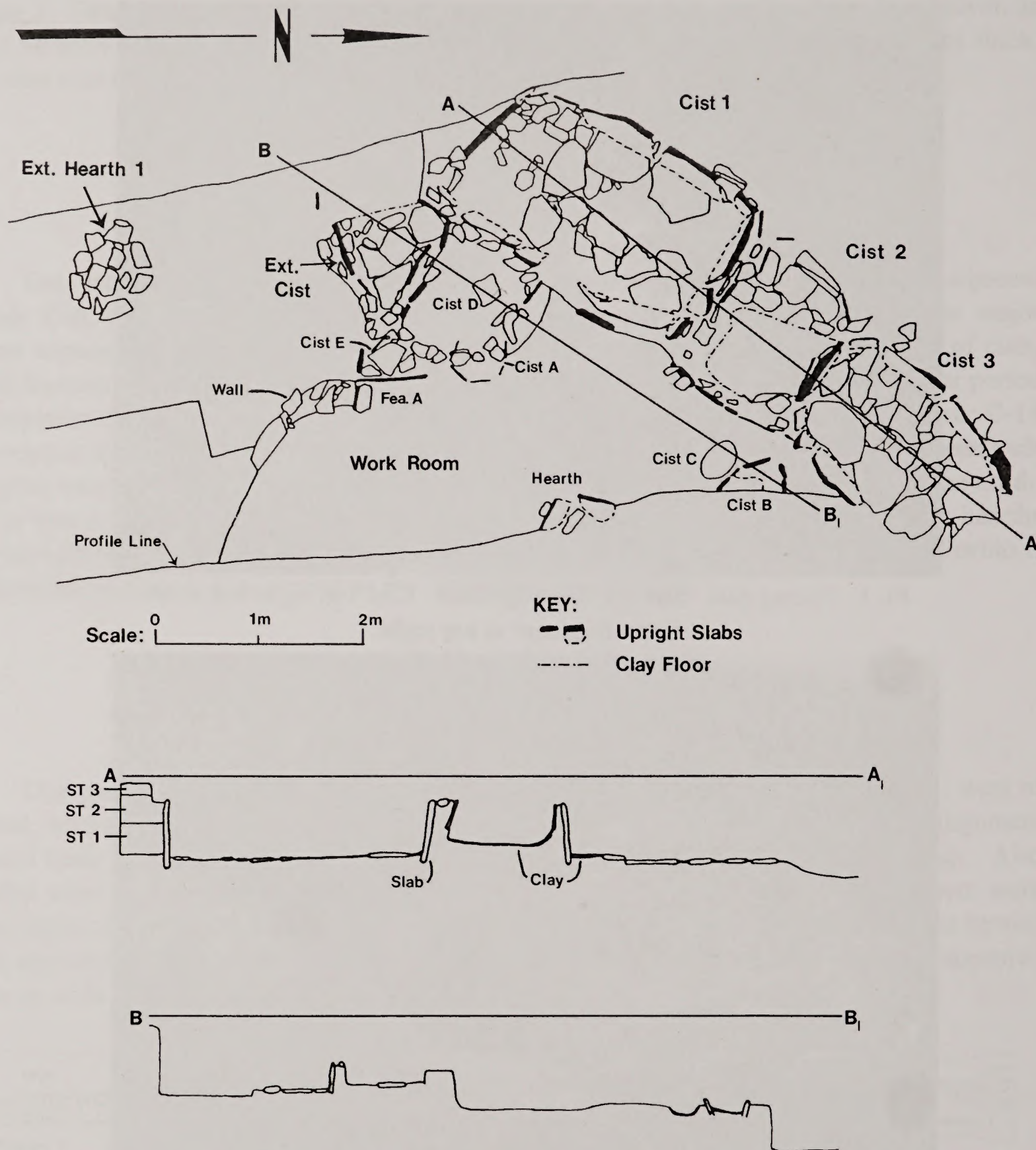


Fig. 7. Cist Alignment with Associated Features and Cross Sections.

Cist 1. As a first step, the features in the cist alignment were defined by removing Strata 2 and 3 along Trench 1 as well as west of it in order to expose the outlines of the structures. Cist 1 was found at the western end of the alignment. The largest of the storage elements, it proved to be ovoid/rectangular in shape, measuring 2.45 by 1.55m (Fig. 7). Following the definition of the cist outline, the eastern half of the fill was removed in order to produce the fill profile (Fig. 8). At the lowest level it was found that the floor was discontinuously covered with brown sand which varied from 4 to 10 cm. thick. The sand layer was, in its turn, covered by a 35 cm. thick layer of highly compacted, charcoal-flecked clay which contained modified sandstone rubble and basalt cobbles. The sand layer on the floor suggested that the structure was abandoned for some time before fire led to the collapse of the superstructure. The idea of destruction by fire was supported by the overlying clay and stone rubble fill as well as the blackening of the wall slabs. The third level of fill was a 15 cm. thick layer of Stratum 2 and, above this, some 10 to 15 cm. of Stratum 3.

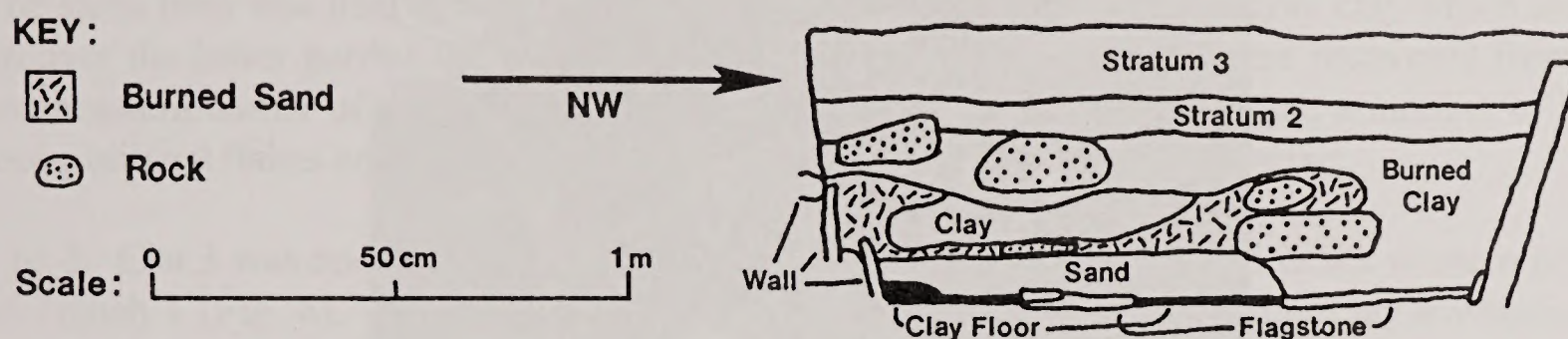


Fig. 8. Cist 1 Profile.

Construction of Cist 1 apparently began with the excavation of a pit into the north to south trending slope of the dune's Stratum 1 sand accumulation. The aboriginal pit was dug approximately 40 cm. below the surface of origin at the top of Stratum 1 or 25 cm. below the modern surface. The pit walls were lined with large, dressed sandstone slabs set 6 to 10 cm. below the bottom of the pit, except on the southeastern side where the bottom of the slabs just touched the floor (Pl. 3). Due to its location on a slope the slabs in this area were braced on the interior by small slabs and clay at the floor and, on the outside, by a mixture of clay, sand and cobbles some 20 cm. thick which acted as a crude wall.

Most of the slabs sloped slightly outward as they were simply laid against the edge of the pit. The slabs were well dressed with some surfaces having been completely pecked. They averaged 40 cm. high and varied in width from 34 to 52 cm. The gaps between the slabs were packed with clay and small stones and tabular fragments. The upper walls originated behind and slightly below the tops of the wall slabs. The walls were made of the mixture of irregularly shaped sandstone, small slabs, and basalt cobbles. Only two courses of stone remained at the time of excavation. The amount of rubble recovered during excavation argued that the walls were several courses higher.

The floor was composed of a complete covering of large and small sandstone flagstones which formed a slightly irregular surface. Gaps between the stones were packed with clay, small stones and small fragments of tabular stone inserted in an upright position. The flagstones were set tightly against the slabs of the lower wall, indicating that the floor was laid after the wall slabs were set in place. The flagstones were covered with a layer of compact clay spread to produce a

more even surface. It proved impossible to determine whether or not the clay plaster also covered the slab walls.

The layer of compact clay excavated in the fill of Cist 1, along with the blackened color of the wall slabs, suggested that above the encircling upper masonry wall, the superstructure was a wooden frame covered with small poles and brush and then covered with a substantial coat of clay. The lack of large burned wood fragments may mean that the frame contained only smaller material or it may mean more complete burning before the frame collapsed to allow the clay covering to drop into cist.



Pl. 3. Facing southwest. Cist 1 with corner of Cist 2 at bottom.

Cist 2. Cist 2 was a small, intermediate feature located between the larger Cists 1 and 3. It proved to be sub-rectangular in shape, measuring 1.32 by 1.1 m (Fig.7, Pl. 1). It penetrated from 28 to 30 cm. below the surface of origin making it somewhat shallower than the other cists. A profile of Cist 2 fill revealed a thin, 1 to 2 cm. thick, discontinuous layer of buff sand on the floor. Above this lay a 30 cm. thick layer of highly compacted gray clay containing chunks of red/orange clay, discrete charcoal flecks and sandstone and basalt rubble. This, in turn, was overlain by Strata 2 and 3.

Construction of Cist 2 began, apparently, after Cists 1 and 3 had been built, with the excavation of a shallow pit. Three of the four sides of the pit were lined with upright slabs which

were backed with roughly coursed cobbles held in place by a mortar of clay and sand. The backing was, in its turn, supported by the wall slabs of Cists 1 and 3 and by a slab of the wall of the Work Room. The northeastern wall was supported by a single thick slab which stood some 20 cm. lower than the other wall slabs. The lower edge suggested that access to the structure was through this uphill side. There was no intact evidence of coursed walls above the surface such as were found in the other cists. The rubble recovered from the clay fill suggested that such walls may once have existed, but the amount of debris argued they would have been quite low. This evidence and the lower volume of clay fill suggested that this may have been a low-roofed feature located between and supported by the two larger cists.

The floor consisted of a layer of flagstone laid directly on Stratum 1. Gaps between the slabs were packed with gray clay, pebbles and occasional thin tabular pieces inserted vertically. The stone floor was then covered with a 1 to 2 cm. thick layer of compact gray clay which sloped up over the lower part of the wall slabs. Pollen and flotation samples were recovered from the southeastern corner of the feature in a floor contact provenience. In addition, a number of bone tools, utilized flakes and burned bean fragments were also found in floor contact.

Cist 3. Cist 3 was one of the first features observed when it was identified in the western profile of Trench 1 (Fig. 6). The profile exposed a layer of highly compacted gray clay averaging 30 cm. thick which contained stone rubble found most abundantly on the southern side. This layer apparently represented a clay roof and collapsed upper wall. The clay was overlain by a thin level of Stratum 2 averaging 15 cm. thick. This, in turn, was covered by a 30 cm. thick blanket of Stratum 3. Due to earlier road construction, only the western part of the cist was intact, although the entire floor remained.

Cist 3, like Cist 1, was apparently built on the south-facing slope so that the northern wall slabs were supported by Stratum 1. The southern wall slabs were apparently braced on the outside with sand and stone. The slabs had all been dressed and tilted slightly outward at the top. They ranged from 36 to 50 cm. tall and from 24 to 79 cm. wide. The gaps between the wall slabs had been packed with gray clay. An upper coursed wall originated directly on top of the upright slabs but the remains were only two courses high. Sandstone dominated the lower course, while the upper course was made of weathered basalt.

The floor was formed by a continuous but irregular surface of sandstone slabs. It was fairly flat in the northern half of the feature but sloped down to the south in the southern portion. Spaces between the flagstones were packed with clay and some parts of the floor were covered with clay, although the covering was not complete at the time of excavation. Small uprights had been inserted at an angle between the floor and wall slabs, apparently to provide greater stability and better rodent protection. With only the floor as evidence, it can be said that the western section of the cist was square while the eastern end was oval (Fig. 7). The floor measured 2.21 m long and 1.3 m wide while its maximum depth was 55 cm.

Cist 4. Cist 4 was isolated by the circumstances of the excavation in that it was east of the road (Fig. 3). It seemed, however, to be in line with the three cists west of the road although it apparently ran at right angles to them. This may represent the terminal curve in the storage

alignment. In addition, within the road bed were a number of large stones suggesting the basal elements of other cists but excavation in the road was prohibited. Cist 4 was first identified during the preliminary testing conducted by the BLM archeologists. East of the road the overlying 10 to 25 cm. of Stratum 3 material as well as spoil from road construction was removed with a blade in order to facilitate excavation. Cist 4 proved to be nearly square in outline with an orientation from southeast to northwest (Fig. 9). It measured 1.7 by 1.5 m and had a maximum depth of 23 cm.

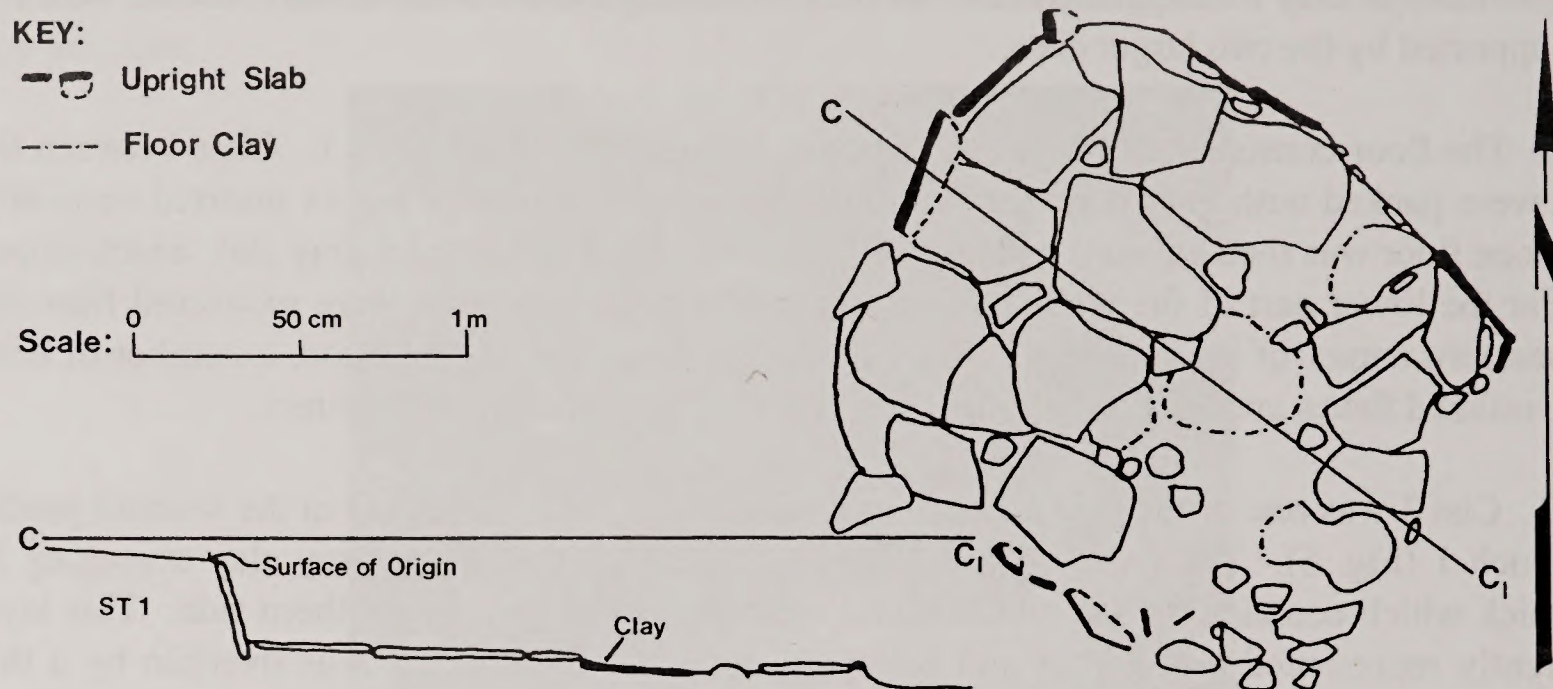
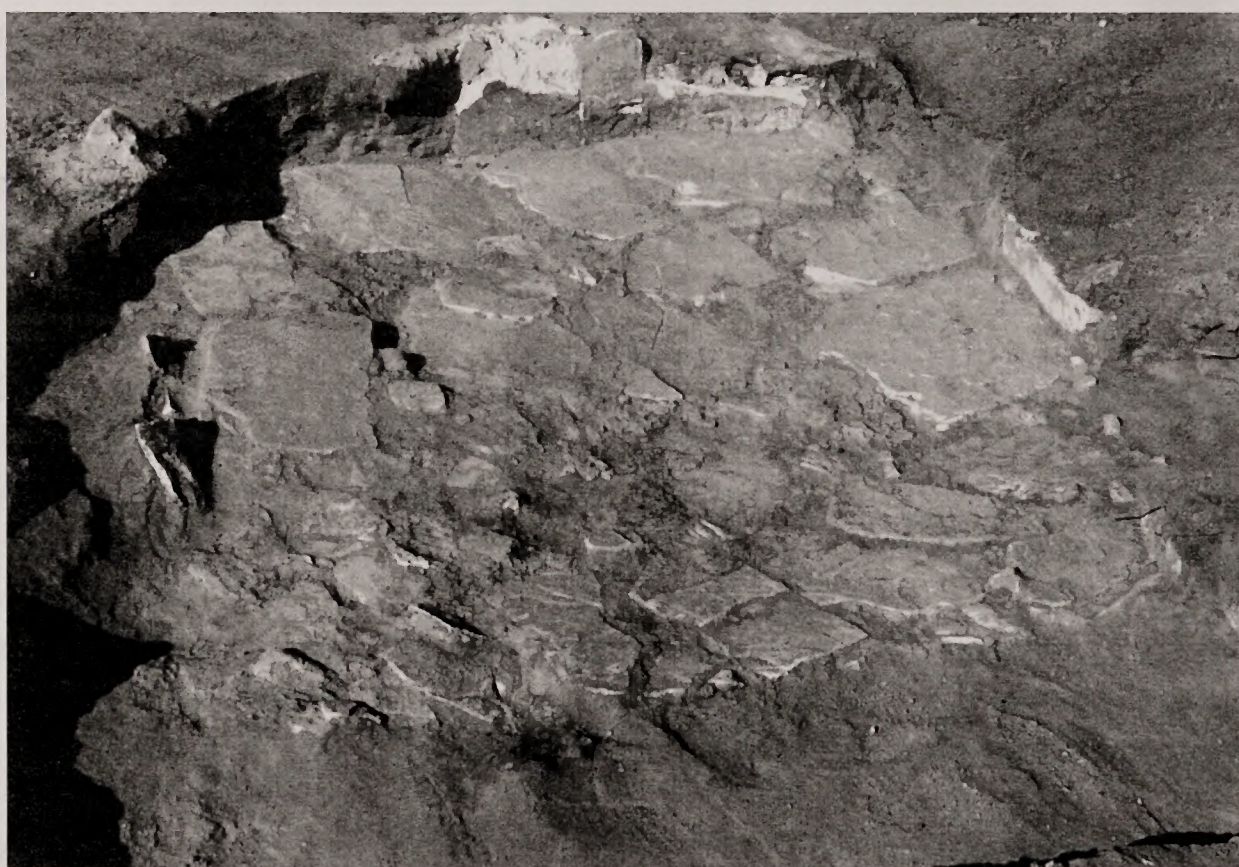


Fig. 9. Cist 4 Plan Map and Cross Section.



Pl. 4. Facing northwest. Cist 4.

Most of the structure's fill was composed of lumps of highly compacted, charcoal flecked, gray clay intermixed with sandstone and basalt cobble rubble. The fill was overlain by a 20 cm. thick layer of Stratum 2. The walls of the structure were incomplete, particularly on the southwestern and southeastern sides (Pl. 4). In contrast to Cists 1 and 3, Cist 4 was built on level ground. A shallow pit, excavated from the upper surface of Stratum 1, reached a depth of 20 cm. The pit was then lined with small upright slabs that varied from 8 to 23 cm. tall. The only indication of an upper wall was the rubble observed within the lower fill, although a coursed stone wall may have existed when the cist was in use. The eastern area of the site seemed to have been the most heavily disturbed, probably during earlier road construction and improvement work.

The floor of Cist 4 appeared to be completely intact. It was composed of sandstone slabs which overlapped and which may have been partially set in clay. Also incorporated into the floor were some hand-grinding tools, implying that the feature was built after some period of site occupation. The floor sloped towards the center and a part of the surface was covered with clay. The edges of the floor were outlined by small upright slabs and rocks which probably served as basal support for the walls, as well as for better rodent proofing. The area outside Cist 4 was cleared to the top of Stratum 1 to look for additional structural evidence. A few large stones were noted 1 m west of the cist, hard against the edge of the road. Though their purpose could not be established, they suggested a continuation of the structure to the west. The evidence implied that this was a slightly isolated, free-standing structure which could be considered a part of the general alignment only by virtue of its position, rather than by actual structural continuity.

Exterior Cist. The Exterior Cist was a small structure, either incomplete or cannibalized, attached to the southwest corner and the southeastern wall of Cist 1 (Fig. 7, Pl. 2). The cist was quite small, measuring 90 cm. northwest to southeast and 70 cm. northeast to southwest. It shared its northeastern wall with the adjacent Work Room but the cist appeared to have been built before the Work Room. The western side of the small storage feature was completely open and the only evidence of its continuation was a small upright slab which may have formed a basal element of the wall.

The interior of the lower walls were formed of upright sandstone slabs which were capped and backed by a roughly coursed wall mortared with orange and gray clay measuring some 15 cm. thick. The slabs stood an average 30 cm. high while the coursed elements of the upper walls were composed of sandstone and basalt cobbles. The floor was formed of sandstone slabs which terminated evenly and abruptly along the western edge. There was no evidence of clay flooring over the stone which appeared to have been laid directly on Stratum 1 material. A single small, upright slab appeared to be a continuation of the southern wall, but it was difficult to tell whether it was a part of this cist or of another which may have been completely eroded away or cannibalized. The clean western edge of the floor suggested that a wall once existed as part of the cist.

Although the Exterior Cist was much smaller than Cists 1 and 3, the construction technique was similar. The main difference lay in the greater dependence of the exterior example upon free-standing walls. Its position also suggested that it was built after the larger cists. In addition, the cist shares its northeastern wall with the Work Room and, in particular, with Cist D (Fig. 7). All of the structural evidence implied that the Exterior Cist was built before the Work Room and well

before interior Cist D, which was one of the later additions to that structure was dismantled or if it was ever completed. It was thus impossible to establish its exact function.

Work Room. The Work Room was a large, structurally incomplete feature which was to the southeastern side of Cists, 1, 2, and 3 (Fig. 7, Pl. 2). Part of the room was lost to the construction of the road which crosses the site. The remaining segment measure 5.5 m north to south and 1.5 m east to west. The northwestern limit of the structure was defined by the cist walls while the southwestern edge was established by the northeastern wall of the Exterior Cist and the base of a roughly mortared and coursed, free-standing wall. The room remnant was thus roughly triangular in shape in so far as it could be defined. The eastern side, it should be noted, was defined by the edge of Trench 1 and the road. It is assumed that the original room was rectangular.

The western wall of Trench 1 produced the profile of the Work Room and it also bisected an associated hearth (Fig. 6). Directly over the floor of the room lay a variable fill level composed of compacted, charcoal-flecked, gray clay which, in its upper portion, became mixed with cobbles and sand. This level ranged from 15 to 30 cm. thick, averaging 20 to 25 cm., and it tended to be thickest along the alignment of the cists to the northwest. The layer included burned, collapsed roof material and the fallen walls of both the room and the storage cists. The roof fall and structural collapse was, in turn, overlain by Stratum 2 some 30 to 35 cm. thick. Above Stratum 2 lay Stratum 3 which varied in thickness from 10 to 40 cm.

The floor of the Work Room was made of mottled Stratum 1 sand, along with a few fragments of clay surfaces of a type usually associated with interior features and walls. Although basically level, the floor varied in depth from 74 to 80 cm. Seven floor features included the hearth, five small cists, and a fragment of an unidentified feature.

Hearth. The Hearth was identified in the west profile of Trench 1 where it had been damaged by the backhoe (Fig. 6). It appeared to have been circular but only a small portion of it remained intact to measure 65 cm. by 45 cm. The sides of the fire pit were lined with upright slabs which leaned slightly outward at the top. The bottom of the pit was covered with a single slab. All of the stone was fire blackened. The inter-spaces between the floor and wall slabs were packed with clay and the floor slab was also set in clay. A thin layer of burned sand and charcoal, 1 to 2 cm. thick, lay at the bottom of the hearth. The sand was covered with roof fall. Fragments of a prepared clay floor were exposed around the rim of the hearth. The presence of roof fall in the hearth indicated that the feature was in use just prior to the collapse of the Work Room.

Cist A. Five small cists, designated A through E, were identified around the edges of the Work Room floor (Fig. 7). Cist A was a small, shallow, and nearly oval, slab-lined feature located in the western corner of the room. The slabs were loosely set only 5 cm. into Stratum 1. All were quite unstable since no clay was used to support the stone. The cist was aligned so that the long axis ran from west-southwest to east-northeast and it measured 50 by 40 cm. and varied from 5 to 7 cm. deep.

It was found that Cist A lay partly below Cist D, indicating that A was the earlier. Complete exposure showed that the north end of Cist A was missing but this appeared to have

been a characteristic of the original structure rather than the result of later cannibalism. Following construction of Cist D, a 20 cm. portion of Cist A that extended from underneath, may actually have been used as a small receptacle at the same time Cist D was in use.

Cist B. Cist B lay in the northeastern portion of the Work Room almost touching the western edge of Trench 1. Measuring 70 cm. north to south and 40 cm. wide, the cist was nearly oval in outline. Built more solidly than Cist A, it was lined with small sandstone slabs set both in and above the floor and embedded in a clay matrix. The floor had been covered with a layer of gray clay and this was particularly well preserved on its southern side. The cist had a maximum depth of 11 cm. but its eastern edge had been removed during the backhoe excavation of Trench 1. The fill consisted of soft Stratum 1 sand, introduced into the clay basin so that the tops of the slabs were visible at floor level. Cist B may once have been a small storage unit which was then filled with sand so that it could serve an alternate function, perhaps as a pot rest.

Cist C. A small, oval, clay-lined basin, designated Cist C, appeared only 5 cm. southwest of Cist B. From northwest to southeast it measured 45 cm. long while it was 30 cm. wide with a maximum depth of 8 cm. The cist was lined with 1 to 2 cm. of dull orange clay which lapped up onto the floor of the room. Cist C was filled with roof fall, a fact which implied that it was open and in use when the Work Room roof collapsed.

Cist D. Cist D was the largest interior feature in the room even though it did not penetrate below the floor. It was built, instead, in the western corner of the Work Room on a 20 to 25 cm. thick pedestal of Stratum 1 sand which was laid down at the point where the walls of Cist 1 and the Exterior Cist met. The northeast and southeast walls were made up of 2 to 3 courses of roughly mortared sandstone which stood an average 27 cm. high (Pl. 5). The northeastern wall was either poorly built (or was never built), perhaps to allow access to the cist from the Work Room. Cist D was nearly circular, measuring 105 by 90 cm. with an average depth of 30 cm. Essentially incomplete, the floor was basin shaped and partially coated with clay and couple of pieces of flagstone. Cist D overlay most of Cist A and its construction formed Cist E, implying that the latter was one of the later features within the Work Room.

Cist E. Formed when Cist D was built, Cist E was triangular in shape and its limits were defined on the northwest by Cist D, on the east by the so-called Feature A, and on the southwest by the Work Room wall (Pl. 5). Upright slabs formed the walls of Cist E while the floor was composed of flagstones partially covered with a layer of clay. The cist measured 65 by 42 cm. with an average depth of 35 cm. The fill contained roof fall, a fact which suggested that Cist E was open and in use at the time of the Work Room collapse. A couple of tools, including a bone awl, were recovered from the fill.

Feature A. A final feature was simply designated Feature A because of the inability of workers to determine its use. The feature was defined by the eastern wall slab of Cist E which formed a right angle with an upright slab incorporated into the Work Room wall. Feature A was thus a partial rectangle which opened to the north and east. A sandstone block 9 to 10 cm. tall was set against the base of the southern wall slab and partially mortared in place with clay. The remainder of the floor was composed of clean Stratum 1 sand, which was level with the Work Room floor.



Pl. 5. Facing southeast. Cist D in the work room. Cist E and Feature A in upper left.



Pl. 6. Facing southeast. Exterior Hearth 1.

Feature A measured 51 by 27 cm. as defined by its wall slabs. The presence of an upright slab within this section of the Work Room wall and its incorporation as part of Feature A suggests that this small feature was built during the initial construction of the Work Room. The general shape and construction of Feature A suggested a mealing bin but the early Pueblo II date hypothesized for the site is probably too early for that function.

The hearth, Cists A and B, and Feature A all appear to have been early structures while Cists C, D, and E were later additions. Further, all but Cist B appear to have been in use when the Work Room collapsed and even it may have been in use in a modified form. All of the features except the hearth were placed around the edges of the room, thus allowing space for activity in the central part of the structure, although no definable activity areas could be plotted on the floor in spite of the fact that tools were recovered from the floor and the lower levels of the roof fall.

Exterior Hearth 1. Exterior Hearth 1 was a large, circular hearth located 3 m south of Cist 1 (Pl. 2). It originated at the upper surface of Stratum 1, supporting the idea that it was contemporaneous with the storage alignment and the appended work room. The hearth was lined with sandstone slabs and rocks slanting slightly outward at the top to a point 2 to 3 cm. above the level of origin (Plate 6). In addition, the lining slabs extended 2 to 3 cm. above the fire-blackened slab bottom and they had been partially packed in clay. The basin-shaped hearth measured 74 cm. north to south and 80 cm. east to west, while it had a maximum depth of 17 cm. The fill consisted of 5 to 10 cm. of blackened sand which was covered by 20 to 25 cm. of Stratum 2 and an average of 20 cm. of Stratum 3. The Stratum 1 surface around the hearth seemed to be use-compacted.

Pithouse Descriptions

Pithouse 1. Pithouse 1 was first noted in Test Trench 5 which, unfortunately, cut away the southern part of the bench and across a vandalized portion of the structure thus making definition somewhat difficult. Shovels and trowels were used to extend the trench to the north in an attempt to expose the upper outlines of the pithouse. Its location, southeast of the storage alignment (Fig. 3), its design, and its level of origin at the upper surface of Stratum 1 implied that the storage alignment and the pithouse were contemporaneous and that the entire complex represented a single period of occupation.

The pithouse was semi-subterranean and circular with a slab-supported and clay-surfaced bench. Interior features included a complete clay floor, two clay-lined basins and a hearth partially encircled by a collar. An interior profile of the partially excavated room exposed four strata of deposit within the structure and these were, in turn, covered by naturally deposited strata (Fig. 10).

Fill Level 1, spread discontinuously over the prepared clay floor, was composed of loosely compacted sand which varied from 1 to 25 cm. thick. Above Fill 1 was Fill Level 2 which was made up of roof fall. Measuring from 50 to 55 cm. in thickness, the level comprised the largest portion of the pithouse fill. It proved to contain large concentrations of clay with darkly stained

sand, discrete charcoal flecks, lenses of clean sand and some stone. Level 2 represented the collapsed clay roof and framework of the pithouse and it was capped by the fallen clay walls. Fill 3 was a 5 to 15 cm thick layer of orange sand which was deposited in the center of the pithouse depression. This may have been produced by a single, short episode of deposition.

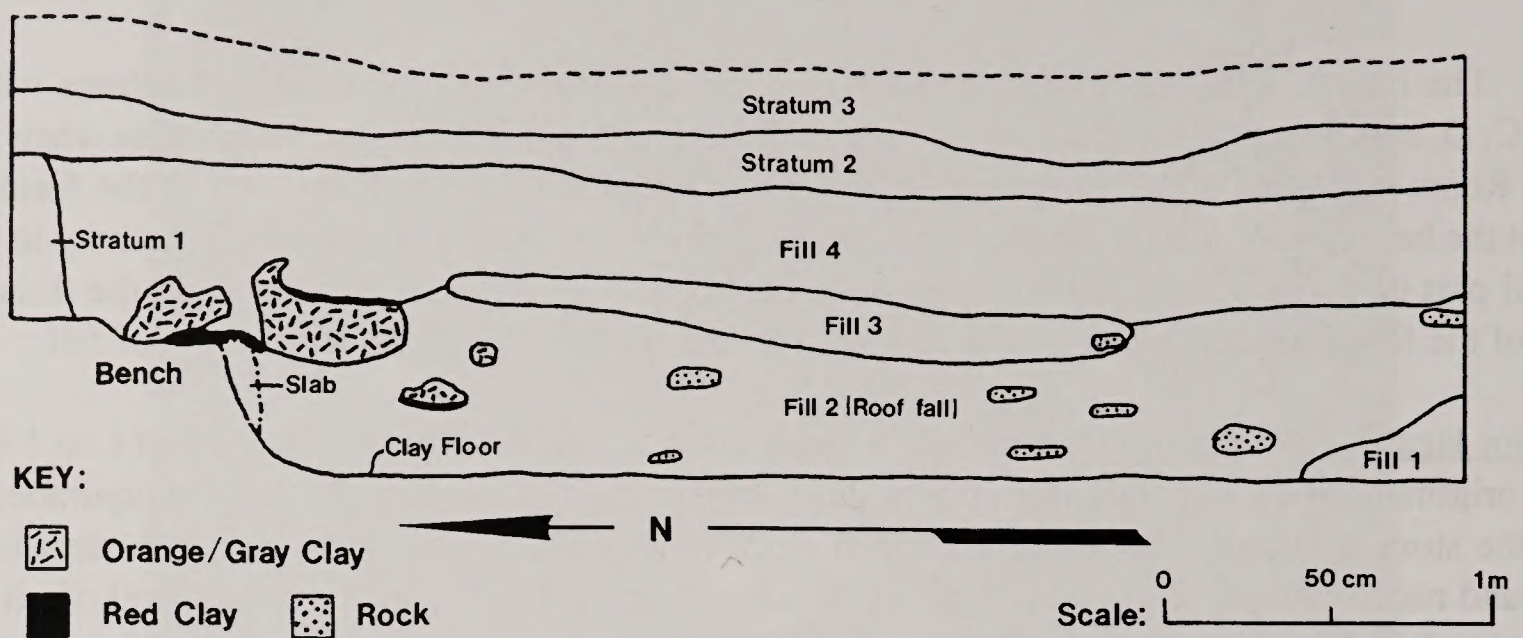


Fig. 10. Pithouse 1 Profile.

Fill level 4 was somewhat similar to Fill 2 except that it was composed of stained sand, a few pieces of charcoal and only a little clay. No stone was seen within this 30 to 35 cm. thick layer which overlay not only level 2, but the bench as well. Stratum 2 covered the entire structure and it proved to be more darkly stained than any of the pithouse fill levels. In the area of the pithouse, Stratum 2 averaged 20 cm. thick and it was overlain by 20 to 25 cm. of Stratum 3 which had been removed by heavy equipment prior to the start of excavation.

The Pithouse 1 surface of origin was at the top of Stratum 1, which was found at a depth of 40 to 45 cm. Construction of the pithouse was begun by digging a pit some 65 cm. into Stratum 1. Some sand may have been left around the edges of the circular excavation to form the base for the bench since one of the earliest steps in construction must have been the placement of the slabs for facing the bench. The bases of the slabs were set from 1 to 6 cm. into the floor so that they were either vertical or leaned slightly outward at the top. Clean Stratum 1 sand and a few stones were used as fill behind the slabs. The sandstone slabs were well dressed and averaged 43 cm. high and 50 cm. wide. Gaps between the slabs and behind the tops at the edge of the bench were packed with clay. The outer wall rose at the back of the bench where it was partially supported by the excavated sides of the pit. No clay was found intact on the bench surface, apparently because of the erosion, but it seems likely that it had once been clay covered. The floor was composed of 0.3 to 3.0 cm. thick layer of compact, gray clay which was laid on a level surface of Stratum 1 sand. When the floor was laid, the hearth and a pair of basins were incorporated into the surface (Fig. 11, Pl. 7). The pithouse measured 4.83 m north to south and 4.88 m east to west at the upper surface.

The circular hearth was centrally located in the room. A profile showed the hearth to be basin shaped with both straight and slanted walls terminating in a flat bottom (Fig. 11). A clay collar was visible on the northern side, averaging 3 cm. high and ranging from 7 to 11 cm.

wide. The hearth was clay lined on the north while the southern portion was eroded, a fact which probably accounted for the absence of both the lining and the collar. The fill was clean orange sand and white ash within a matrix of darker gray ash which contained small charcoal pieces. A radiocarbon date of A. D. 940 was obtained from the material.



Pl. 7. Facing south. Pithouse 1 with basins in foreground. Floor contact artifacts remain in situ. Trench 5 at rear.

The hearth measured 74 cm. east to west and 83 cm. north to south while it was 15 cm. deep. A partial clay ridge appears to have extended to the southeast from the hearth to the edge of the room. The ridge averaged 8 cm. wide and was 85 cm. long. A thin groove or trough ran down the center of the ridge. Other sites exhibiting a similar feature usually showed the ridges to occur in pairs, with each ridge extending from the hearth to the edge of the pithouse to form a trapezoidal area between the hearth and the wall. This, of course, required two ridges. If another ridge existed in this case, it probably extended into the vandalized area of the structure. Either vandalism or erosion, which was also evident, could have destroyed the remainder of the feature.

A pair of sub-floor, sand-filled, clay-capped basins were found on the northern side of the pithouse. Basin 1 was the most westerly and the smaller of the two. It measured 53 by 39 cm. with a depth of 20 cm. The pit was oval with vertical walls and a slightly basin-shaped bottom. The bottom and the sides, except on the western edge, were lined with clay. The clay of the basin floor did not actually connect with the clay of the walls. The fill consisted of clean orange sand in which a stone had been placed 7 cm. above the floor. The basin and its fill were then capped with 3 cm. of gray clay containing discreet charcoal flecks.

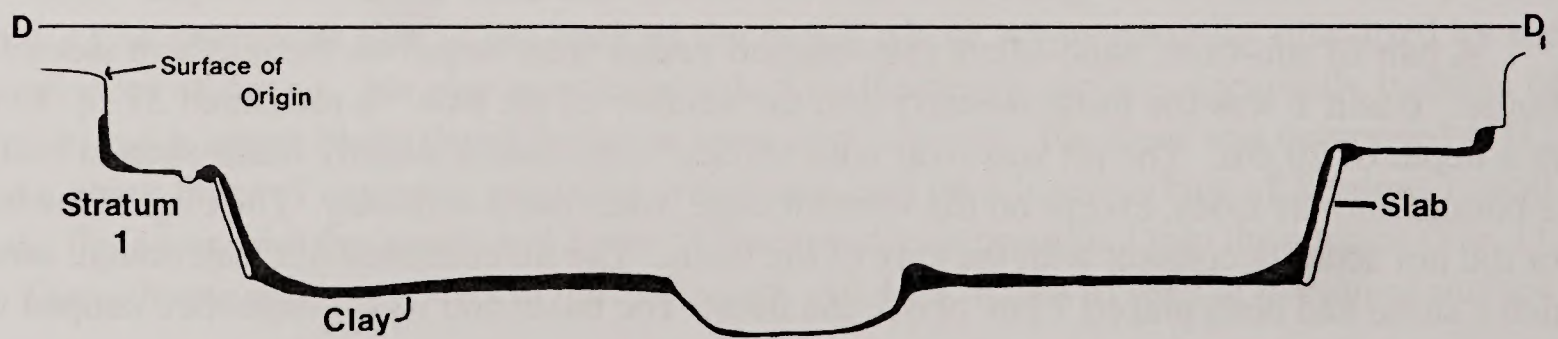
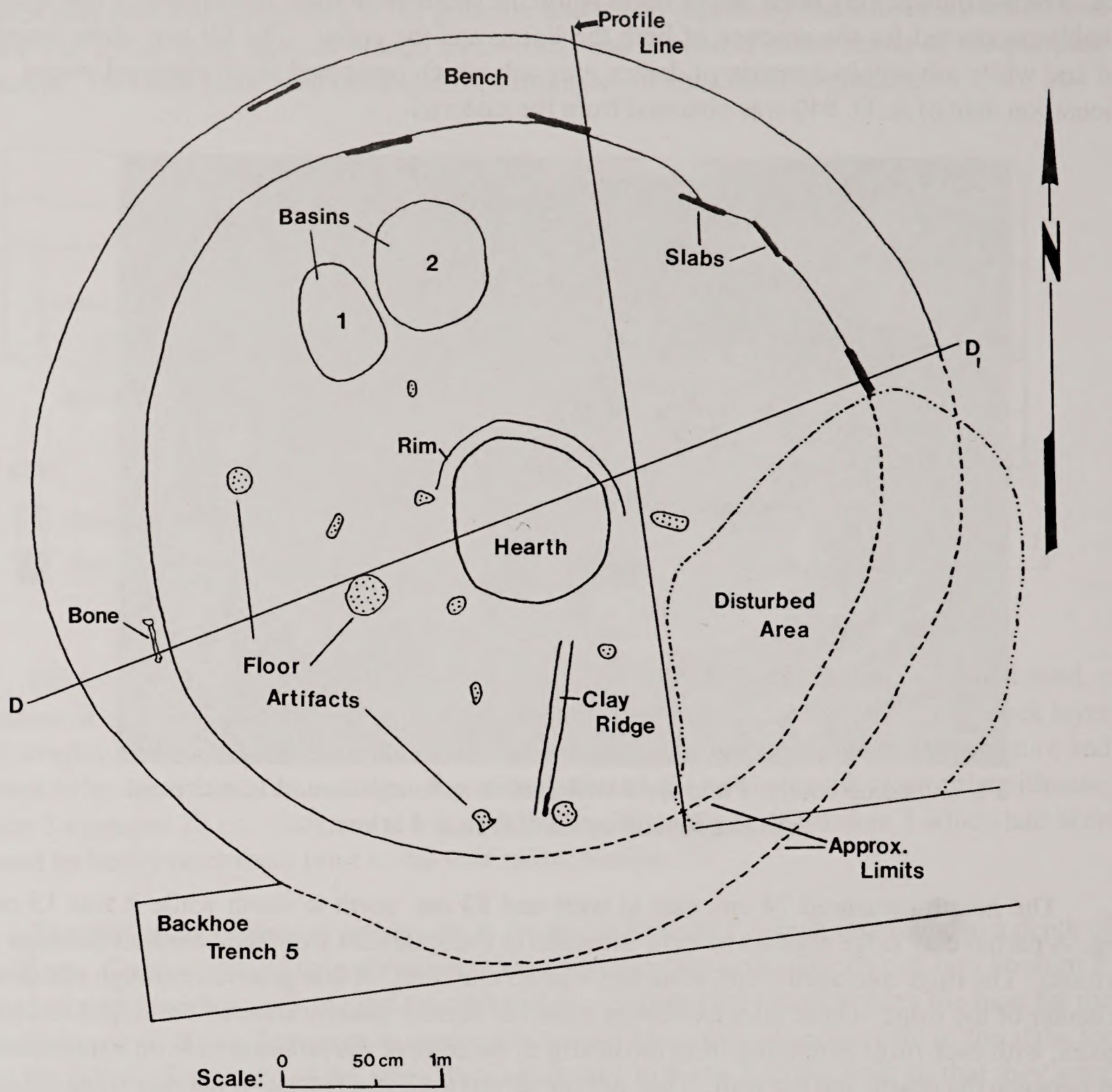


Fig. 11. Pithouse 1 Plan Map and Cross Section.

Basin 2 was located 5 cm. east of Basin 1. It also proved to be oval, measuring 68 cm. by 54 cm. with a depth of 19 cm. The walls were almost vertical and the entire pit was lined with a clay layer from 1 to 1.5 cm. thick. The fill was orange sand which contained a tabular piece of stone along with some charcoal flecks and small pieces of clay. Finally, the pit was capped by a layer of gray clay from 1 to 4 cm. thick.

Artifacts found on the floor of the pithouse included ceramic concentrations along the southeastern edge, a number of hand-grinding stones and several bone tools. A good collection of artifacts and botanical remains were found in the lower 10 cm. of Fill 2, suggesting that tools and food were stored in the rafters of the roof. This might argue that the structure had not been entirely abandoned at the time of the fire that destroyed the structure.

It was the amount of charcoal in the pithouse fill and the darkly stained sand that suggested the pithouse was destroyed by fire, perhaps at the same time that fire consumed the superstructures of the storage cists and the Work Room. Following its initial collapse, erosion seems to have completed the destruction of the pithouse by causing a melting of the clay exterior walls over the bench and into the interior of the room.

There was no evidence of interior post holes on the floor and there were no post molds incorporated into the outer walls, such as might be expected with an exterior support system. Fill levels indicated that the roof was formed of a layer of gray clay but evidence of a supporting wooden framework was lacking. In the northeastern quarter of the pithouse, deteriorating sticks were noted in Fill 4 where they lay in a pattern which seemed to radiate from the center of the room. The sticks averaged 8 cm. wide and 60 cm. long, but they offered only tenuous evidence of room construction.

Pithouse 2. Pithouse 2 lay near the northern limit of the site where it was first exposed in Backhoe Trench 7 (Fig. 7). It contained features similar to those of Pithouse 1, but its location northeast of the storage cists and other features of the site suggested that its occupation was not related to most of the other excavated features. Supporting this view was the presence of a low rubble mound northeast of Pithouse 2 which suggested another storage alignment. Since the rubble was located outside of the right-of-way, it was not investigated. Its spatial relationship to Pithouse 2 did suggest a possible association, however.

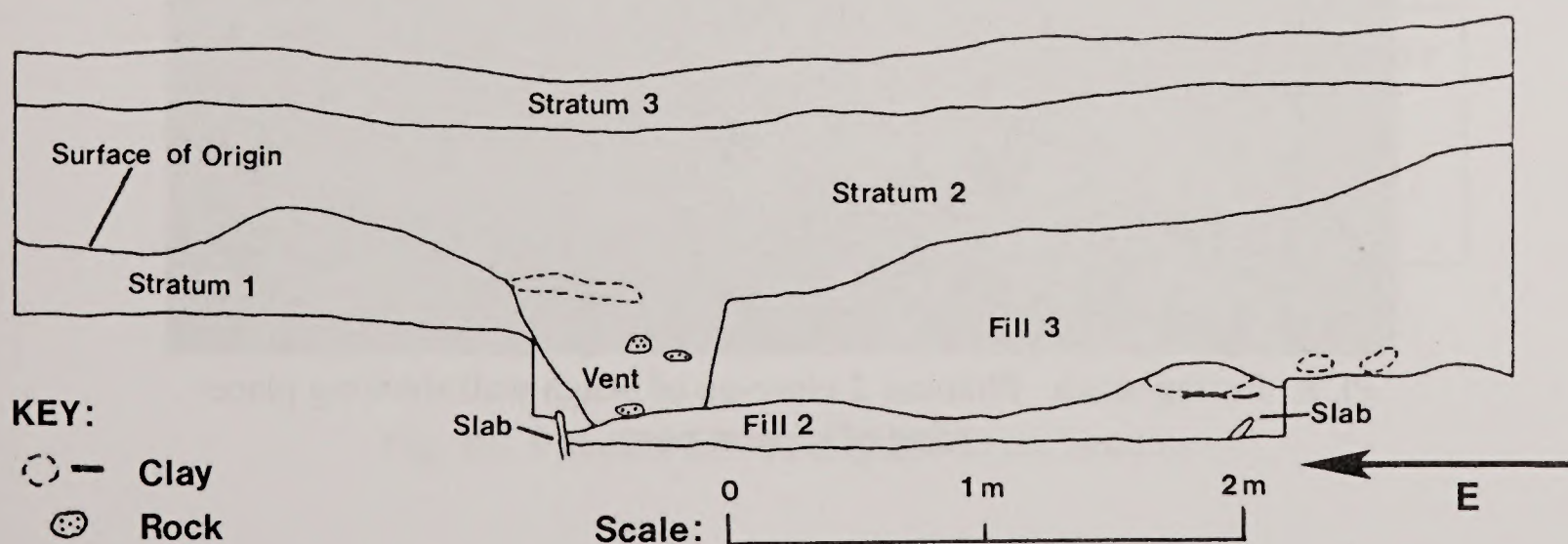


Fig. 12. Pithouse 2 Profile.

Trench 7 cut across the southern part of the pithouse, exposing not only its location, but the ventilator shaft and the interior stratigraphic profile (Figs. 12, 13). Fill Level 1 proved to be a thin layer of clean, orange sand which overlay the floor to a depth of 1 cm. This was covered by Fill Level 2, a continuous layer of roof fall which varied from 10 to 30 cm. thick. The level contained compact gray clay mixed with stained sand, charcoal flecks, and both lumps and lenses of red clay. The inclusions appeared to represent elements of the collapsed roof and probably parts of the wall. The roof fall was, in its turn, overlain by Fill Level 3 which involved 40 to 65 cm. of light brown sand of medium compaction which included occasional lumps of gray clay. Fill 3 was covered by 40 to 70 cm. of Stratum 2 and, above that, by Stratum 3.

Pithouse 2 was a large, circular, semi-subterranean structure with a partially encircling bench and a ventilator shaft entering from the southeast. The shaft was associated with an antechamber, and the entire structure measured 4.4 m north to south and 4.25 m east to west. Floor features included a centrally placed conical hearth and four sand-filled, clay-capped, basins.

The prehistoric builders began construction by digging the main pit from the top of Stratum 1, which was initially identified by excavators at a depth of 40 to 60 cm. The pit was excavated to a depth of 95 to 105 cm below the surface of origin. The next step appeared to have involved setting posts around the edge to form elements of the outer wall and bench. The post molds preserved in the outer clay wall, varied from 7 to 11 cm. in diameter and were set an average 30 cm. apart (Pl. 8). The next step apparently involved the construction of the bench since it would have further stabilized the outer wall roof support posts.



Pl. 8. Facing south. Pithouse 2 close-up of bench wall showing placement of support posts.

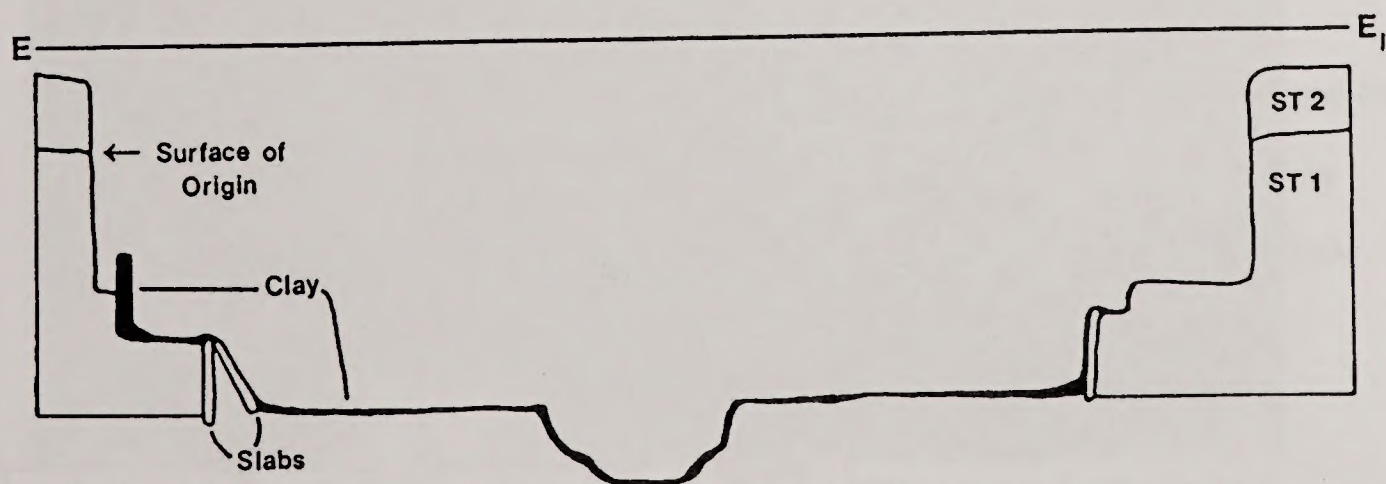
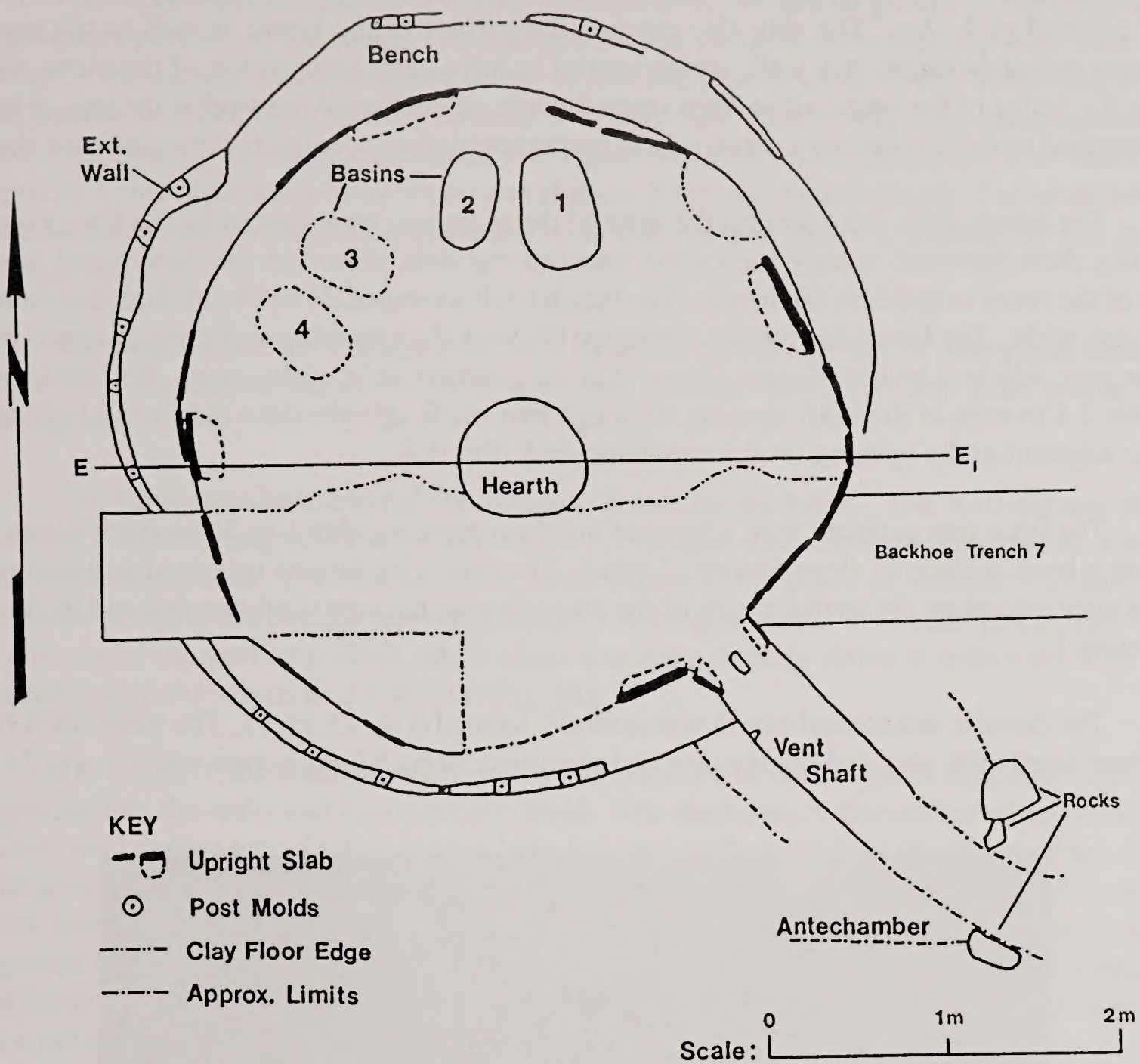


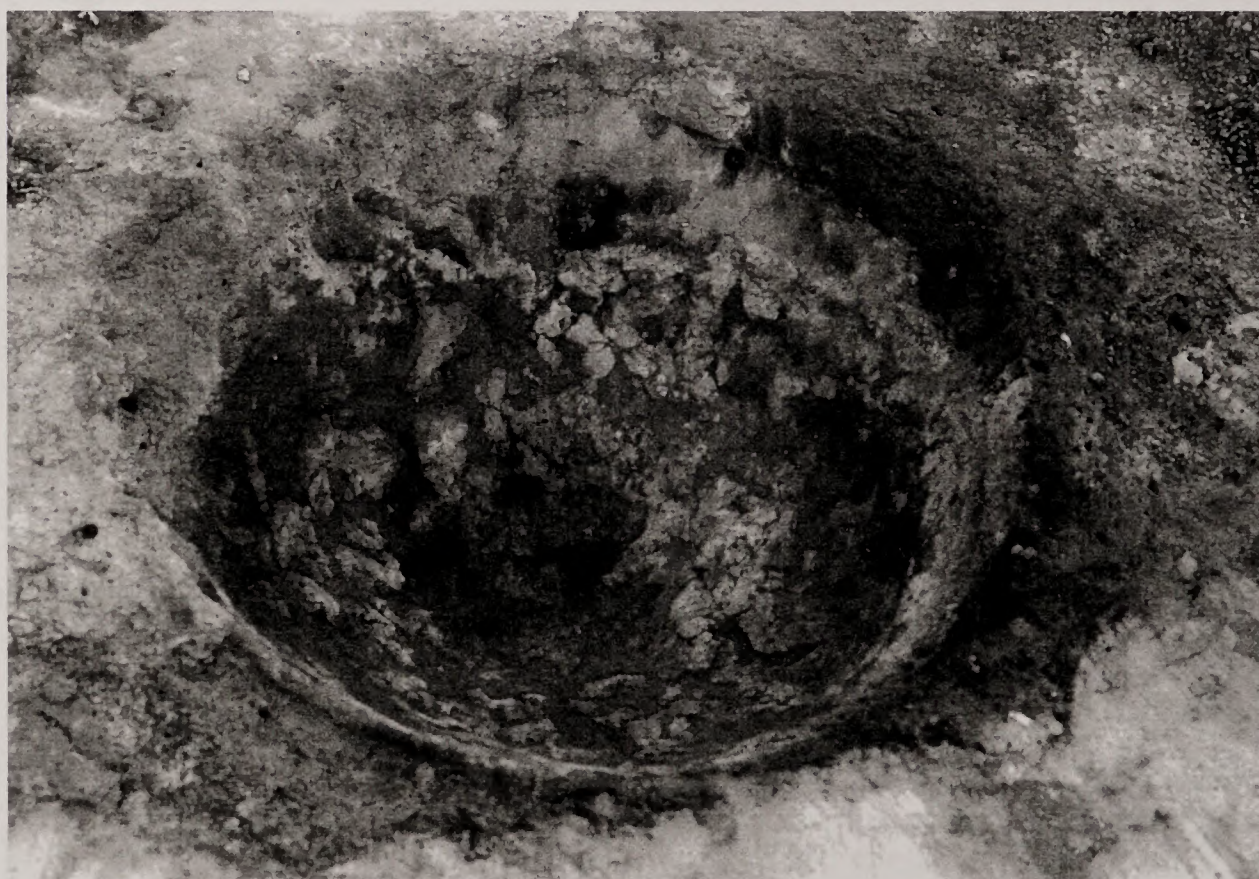
Fig. 13. Pithouse 2 Plan Map and Cross Section.

The interior face of the bench was intermittently lined with pairs of roughly shaped upright slabs covered with clay. The clay also covered the surface of the bench as well as the base of the outer red-and-orange-clay wall, which proved to have been built on top of the clean, sandy bench fill. Some of the bench slabs were vertical while others leaned outward at the top. A break incorporated in the southeastern corner of the room provided an opening for the ventilator shaft.

The bench slabs were set into the floor of the room and were braced by the floor clay. In addition, there appeared to have been some later bracing slabs placed on the eastern and western sides of the room to stabilize the bench. The bench itself averaged 24 to 39 cm. high and from 25 to 40 cm. wide. The bench narrowed as it neared the vent shaft opening and it also dropped down on the east side to a height of only 13 cm. On the southern side of the room, the bench ended roughly 1.4 m west of the shaft opening, although two small, upright slabs did form a right angle corner adjacent to the opening for the ventilator shaft (Fig. 13)

The floor was surfaced with a layer of highly compacted clay 1 to 5 cm. thick which was laid on a level surface of clean Stratum 1 sand. The floor clay lapped up over the bases of the bench slabs except on the southern side of the pithouse near the vent shaft opening and in the area of Trench 7.

The circular and conical hearth was centrally located (Fig. 13, Pl. 9). The steep sided-basin had been lined with gray and orange clay and measured 70 by 67 cm. across while it was 31 cm. deep.



Pl. 9. Facing east. Pithouse 2. Close-up of centrally located conical hearth.

Four clay-capped, sand-filled basins were found in two paired groups in the northern and northwestern portions of the room. The northern set was partially excavated and both were ovoid in shape. The eastern basin measured 66 by 46 cm. and proved to be 17 cm. deep. The straight sides and the floor had been partially covered with gray clay. The fill was fairly clean sand similar to that of Stratum 1 although it contained a few pieces of charcoal flecked clay. The feature was capped by a clay layer 4 cm. thick which was slightly depressed on the surface. The more westerly of the northern pair was slightly smaller and more truly oval in shape, measuring 51 cm. long by 35 cm. wide.

The two northwestern basins were only sketchily defined. A day of heavy rain ended any chance for more precise definition. Both were oval in shape and apparently quite similar to the northern pair.

The ventilator shaft entered the pithouse from the southeast. The well-defined portion measured 1.45 m. long by 38 to 42 cm. wide. At its outer end, the shaft appeared to open into a shallow antechamber. The section of the shaft closest to the pithouse was partially lined with upright slabs while the bottom was natural sand. A sandstone rock had been placed just within the opening of the ventilator shaft, and a mano was lying directly above it within the fill. These elements may have served as a deflector (Fig. 14).

The limits of the shaft were defined by the presence of burned sand, clay, and cobbles, all suggesting that the walls had been partially lined. The shaft rose to the surface of origin within a shallow, oval depression which may have been the vent shaft opening or an antechamber. The fill in the area was composed of burned clay, darkly stained sand, and cobbles, that ranged from 15 to 40 cm. thick. A few cobbles around the edge of the depression, along with the cobbles in the fill, suggested that a low coursed wall had once outlined the feature. The floor was highly compacted sand while the part of the depression actually exposed measured 1.1 m northeast to southwest and 2 m northwest and southeast.

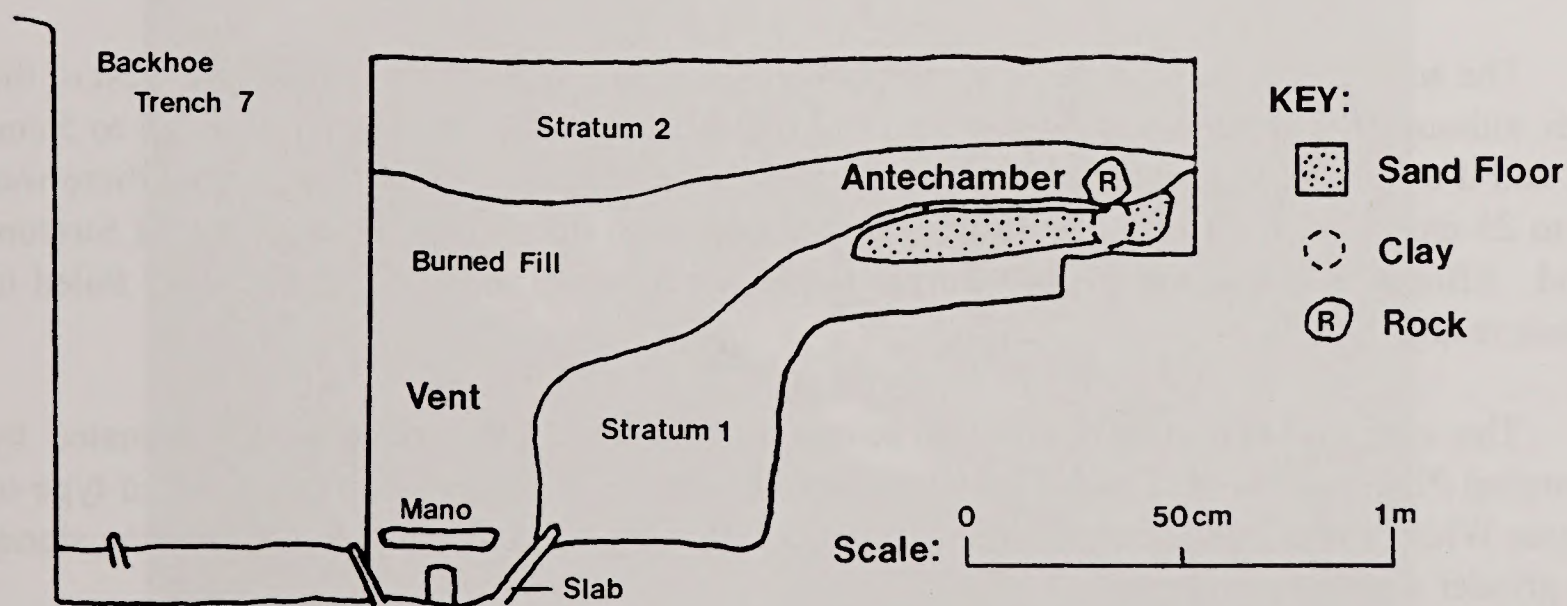


Fig. 14. Pithouse 2 Profile of Ventilator Shaft and Antechamber.

Pithouse 2 yielded a smaller artifact collection than that found in Pithouse 1. The artifacts from both structures were quite similar, however. Both ceramic collections were dominated by Shinarump Plain and North Creek Gray. While utilized flakes were the most common lithic material in each structure, the amount of lithic refuse proved to be rather limited. The number of bone tools and pieces of modified bone collected suggested considerable reliance on bone as a resource material.

The very limited collection of tools found in the lower fill of Pithouse 2 suggested that it was abandoned prior to collapse. This observation seemed particularly striking when compared to the abundant finds in Pithouse 1. Evidence of remodeling was found in the bracing of the bench slabs, which argued that the pithouse was occupied at least long enough to require additional labor to maintain it in usable condition. The absence of the floor clay in front of the ventilator shaft seemed to indicate that that shaft was left open, either during occupation or after abandonment, causing the floor to erode. The condition of the roof-fall stratum and the blackened fill from the ventilator shaft and antechamber indicated that Pithouse 2 burned after being abandoned. It seemed likely that the fire was limited to the roof of the structure and that many supporting posts were not affected by it, although the outlying ventilator shaft and antechamber were more severely burned.

Miscellaneous Features

Exterior Hearth 2. Exterior Hearth 2, with an associated clay surface, was first observed in the western profile of Trench 1 (Figs. 3, 4) south of the primary structural area. The hearth was a circular, clay-lined basin which was only partially disturbed by the backhoe cut (Pl. 10). It originated within Stratum 2 and, measuring 88 by 57 cm, it was 25 cm. deep. The fill included a 1 cm. thick deposit of charcoal in the fire-blackened bottom which was covered by 20 cm. of gray compacted clay.

The adjacent prepared clay surface extended some 3 m to the north and 50 cm. west of the hearth, although the surface was deteriorated and fragmentary. The clay varied from 0.5 to 5 cm. thick and it overlay a 10 cm. deposit of blackened Stratum 2 sand. Above this surface there was a 20 to 25 cm. thick layer of more Stratum 2 and, overlying this, some 10 to 15 cm. of Stratum 1 sand. Efforts to follow the surface further to the north, west, and even to the south failed to produce results.

The ceramic collection from the hearth and its adjacent surface was dominated by Shinarump Plain and North Creek Gray. Also included were 4 sherds of an unidentified type of Tusayan White ware. A number of biface flakes, a bifacially worked tool and an abrading stone/edge grinder were also collected.



Pl. 10. Facing west. Exterior Hearth 2 as cut by Trench 2.



Pl. 11. Facing west. Exterior Hearth 3. Shows use of ground stone in construction of feature.

Excavation experience has shown that clay-lined hearths with surrounding clay surfaces tend to be parts of structures but in this instance, erosion and road construction prevented identification of structural evidence. At the same time, well-packed clay fill within the hearth looked much like the fill produced by structural collapse. It could, however, have been the result of floor erosion and melt following the use of the hearth. To put it simply, neither the structural role nor the function of the feature could be established on the basis of the evidence at hand. The stratigraphic evidence did argue that the feature was constructed following the abandonment of the main early Pueblo II area.

Exterior Hearth 3. Exterior Hearth 3 was a small slab-lined hearth located north of Hearth 2 and south of the cist alignment and the Work Room (Fig. 3). It was originally circular but since it was cut by excavation, it measured 72 cm. north to south and 50 cm. east to west while it was 18 cm. deep (Pl. 11). The sloping sides of the hearth were lined with sandstone, basalt cobbles, and ground stone fragments, all of which were packed in with clay. Additional support stones were placed behind the stone at the top of the hearth while the bottom was covered with a small sandstone slab fragment. All of the stone was thoroughly fire-blackened.

The hearth originated within Stratum 2 at a depth of from 35 to 53 cm. and the fill was also made up of Stratum 2 sand. The stratigraphic position of the feature implied that it was used following the construction of the storage complex and perhaps slightly later than Exterior Hearth 2. Appearing to be an outdoor feature, the hearth failed to produce a carbon sample.

MATERIAL CULTURE

Introduction

In the preparation of the sections on material culture, the senior author did all of the work on stone and bone materials while the junior writer undertook the work of ceramic analysis and illustration. The flotation separation of the macrofossil samples was the work of Barry Frank, while the analysis of the samples was performed by Kathleen M. Heath, whose work is presented in Appendix A, below.

Two features stand out in this archeological "show and tell." In ceramics, this project represents the first attempt to deal with the Shinarump Series in Virgin Anasazi work. Much remains to be done before a good understanding of the series will be accepted but the present report should make a substantial beginning. Shinarump sherds were not only abundant at Dead Raven, they were the dominant form. As such, this project represents the largest single collection thus far subject to study and publication.

The second feature is the remarkable abundance of bone tools. Traditionally a limited class of artifacts in Virgin Anasazi sites, the Dead Raven collection offers the first good evidence that Virgin Anasazi may have been close to the Parowan Fremont in their use of bone tools. It is suggested that failure to find these at other sites is the product of poor preservation conditions. At Dead Raven soil conditions appear to have been so different that the quality of the artifacts, if not their abundance, matches that of the massive finds of the Parowan Fremont at the Evans site in Iron County, Utah.

Ceramics

An attempt to analyze the sherds recovered from Dead Raven opens the Pandora's Box of one of the most difficult and controversial issues of ceramic taxonomy in southern Utah and northern Arizona. The issue involves the nature of the type, its cultural affiliation, and its areal distribution. There does seem to be general agreement that Colton's (1952) descriptions of the Shinarump series does not square with what is presently termed Shinarump. Robert Euler recently examined the type sherds at the museum of northern Arizona and has declared that they bear no resemblance to what is presently called Shinarump. He made no comment, however, concerning the degree to which the type sherds fit the description found in the Colton manual. It is suspected that the sherds in the type collection do fit the sherds described by Colton and that what has happened is that an entirely different collection of material has now assumed the name of Shinarump.

To account for this unusual circumstance, a number of historic factors must be taken into account. First, of course, is the fact that Colton (1952) states that Joseph E. Spencer named the sherds for the Shinarump Cliffs of Coconino County, Arizona. This is curious since the record

shows that the sherds came from a site on the west bank of North Creek a short distance above the point where that stream empties into the Virgin River. This is just south of the town of Virgin, Utah, well into Washington County.

The choice of the name is curious. Archeologists traditionally name artifact types for geographic features significant to the area where the type was first identified. This practice does not seem to apply in this case even though it is understood that the name of a type does not necessarily indicate the center of manufacture of the item. However, there is no evidence showing that Spencer spent time in Kane County during the years of his work in the St. George Basin. He may have used the term "Shinarump" for a type, but we cannot be sure that he named the sherds for the Shinarump Cliffs. Could it be that this was Colton's assumption? It is possible that Spencer named his sherds for the Shinarump Formation which is exposed in significant parts of the St. George Basin as well as on top of Little Creek Mountain and other areas east of the Hurricane Fault. If he used the name without explanation, Colton's examination of a map of southern Utah would quickly show the Shinarump Cliffs on the Arizona/Utah border but well east of the area in which Spencer worked.

It should be noted that there are sherds which meet the early Colton description. They are never common and, apparently, because of their low frequency, they have usually been dismissed as local or chance deviations from sherds of the Virgin series. They are definitely not, however, the sherds that are now called Shinarump even though they are quite dark in color.

Curiously enough, Colton may have begun the shifting use of the term a good ten years before he published his Pottery Types of the Arizona Strip and Adjacent Areas in Utah and Nevada (1952). Writing at some time between his 1937 field work and the 1942 publication date, Edward T. Hall raised the issue of Shinarump in his Archeological Survey of Walhalla Glades (1942, p. 21).

Intentionally oxidized sherds of Shinarump Brown are identical to Middleton Red. No whole vessels of the latter are known to the writer, it is possible that sherds so labeled are merely accidentally oxidized Shinarump Brown.

Colton has proven, by tests with Shinarump Brown, Shinarump Corrugated and Middleton Red that all of these sherds, when fired in a reducing atmosphere, will burn to dark gray typical of Shinarump Brown. Parts of the same sherds when fired in an oxidizing atmosphere closely resemble Middleton Red. Dr. Colton has been kind enough to subject some sherds (N.R. 234-242), to oxidizing and reducing tests for the writer in verification of this point. In the light of his results it is entirely possible that Middleton Red is accidentally oxidized Shinarump Brown. Sherds of the latter when oxidized turn to a similar red. Middleton Red sherds in a reducing atmosphere turn to gray. How much of the firing was deliberately controlled by the potters is a matter of conjecture, at the present time no whole vessels are available for diagnostic purposes.

The sherds already described under "Shinarump Brown Ware", (N.R. 175, 184, and 185), are not included among the above type duplications. These soft paste sherds are

quite different in composition from the run of the Utah Series, when comparative material is available they may fall into a general Colorado River series.

The final paragraph of Hall's remarks surely indicates that both Hall and Colton were shifting their attention to a different group of sherds. The temper described by Colton in 1952 bears no resemblance to the temper in Middleton Red or in what is presently known as Shinarump. There is, however, some similarity between the temper in Middleton Red and the temper in the currently recognized Shinarump. At the same time, it would appear that Hall was setting aside sherds that he had called "Shinarump" which he later suggests "may fall into a general Colorado river series." Without an opportunity to examine these sherds, it is impossible to be certain but it does seem that they fit the description in Colton's 1952 manual. Sherds meeting this description are currently being found during the course of ceramic analysis of the third season of excavation at 42Ws920 on Little Creek Mountain in Washington County, Utah.

It would do well to compare Colton's 1952 description of Shinarump with one prepared by Robert C. Euler in December, 1986 following a meeting with a number of others concerned with the problem. This comparison will use the Colton discussion of Shinarump Brown which appears to have been regarded as the principle plain ware in the series. (It would be well to note a personal conviction that the use of color terms in type designations is most undesirable and recent practice for many has been to speak of Shinarump Plain without reference to Gray or Brown.)

Shinarump Brown

Described By: Spencer, J. E., 1934, p. 75.

Named By: Spencer, loc. cit. for Shinarump Cliffs, Coconino County, Arizona.

Type Specimen: Not separated by describer. Cotype sherds Nos. AT 752-774 in the type collection at the museum of Northern Arizona.

Type Site: Spencer's Site No. 4 (NA 3551), on west bank of North Creek near junction with Virgin River, Utah. (See Spencer, 1934, map on p. 71).

Stage: Pueblo III (/) [sic]

Description (revised); Constructed: by coiling and scraping. Core color: dark gray, often tan or light reddish-brown near surface; occasionally brownish through. Clay probably from a residual source. Fired: apparently in poorly controlled oxidizing atmosphere, which is sometimes partly reducing. Temper: abundant opaque angular fragments of widely varying sizes, mostly gray, sometimes black, tan or reddish; occasional grains of quartz sand. Texture of core: medium fine to medium coarse. Walls: medium strong to medium weak. Surface finish: both surfaces of bowls and exterior surfaces of jars, scraped, sometimes moderately smoothed; scraping marks noticeable but not conspicuous; somewhat pitted. Interior surfaces of jars sometimes smoothed, but frequently very rough and deeply pitted. Surface color: dark gray to purple gray, sometimes tan. Forms: jars, bowls. Range of thickness vessel walls: 3.8 to 6.5 mm.; greatest individual range, 1.5

mm.; average thickness, 5 mm. Bowl rim: IIIA3(2). Jar rims: IB3(4), IC3(2). No painted decoration.

Comparisons: North Creek Gray has light colored paste with temper mostly moderately fine quartz sand; surfaces usually considerably better smoothed; surface color light bluish-gray, with only slight tan or brownish tinge. Little Colorado Gray, which resembles by having a dark paste, has a temper containing possibly a little less quartz sand and more sherd, surfaces more rough and deeply scored; surface color usually darker than little Colorado Gray Ware, but individual sherds are often indistinguishable. Lino Gray has light colored paste with temper composed entirely of quartz sand; scraping marks usually more noticeable.

Range: Upper Virgin River Valley, from near the junction of Zion Canyon to and including Santa Clara Creek, Utah.

Before presenting the Euler description, Colton's reluctance to speak of sherd temper should be noted. In his description of Shinarump temper, Colton speaks of "abundant opaque angular fragments of widely varying sizes, mostly gray..." but he gives no indication of what the fragments may be. In the section on comparisons, however, he uses Little Colorado Gray as an example and says that Shinarump has "...a little less quartz sand and more sherd..." He failed to suggest the presence of sherd temper in the original description possibly because he often appeared to be unsure about the reality of crushed sherd in the temper of any type.

When he referred to the 'widely varying' size of the gray fragments he was pointing to a problem that persists today. When the gray angular fragments are quite small, the present writer hesitates to call them crushed sherd but when the fragments are large, it often seems to be quite clear that sherd is a part of the temper. If this is the case, the original 'Shinarump' may be nothing more than a part of the Johnson series which Colton so hesitantly postulated.

It is inevitable that Euler's description of Shinarump Plain is more closely in tune with current thinking on the matter, but it is equally certain that there are points in his discussion with which many will take issue.

Shinarump Plain

Constructed: coil-scraper

Core color: dark gray to purplish gray to reddish brown; dark paste. Residual clay containing ferric iron.

Fired: poorly controlled oxidizing atmosphere, sometimes sub-vitrified.

Temper: usually clear to translucent, occasionally opaque rounded to sub-angular quartz sand; opaque whitish coating on sand grains in some sherds may indicate crushed sandstone rather than arroyo sands. Sometimes inclusions of cream, light tan, reddish or

black sub-angular fragments of mixed lithology.

Texture of core: medium fine to medium coarse; occasionally granular.

Surface Color: primarily purplish; sometimes gray-brown; [add other Munsell colors] sometimes will vary from core color. (Note that Shinarump Corrugated has the same description and includes both Tusayan and Moenkopi style corrugations.)

Center of manufacture: vicinity of Johnson Canyon, Vermilion Cliffs, and Fredonia.

Dates: A.D. 1000-1150 Pueblo II in Pecos Classification.

Cultural tradition: Kayenta tradition.

Range:

Perhaps the first and most obvious point of discussion with reference to Euler's description of Shinarump comes in the matter of center of manufacture. Euler states that the area includes Johnson Canyon, the Vermilion Cliffs, and Fredonia. As will be seen, Johnson Canyon will hold up but the Vermilion Cliffs can hardly be a regional definition. According to USGS maps, the Vermilion Cliffs begin just east of Big Plain in southeastern Washington County, roughly at Smithsonian Butte. They run in a southeasterly direction into Mohave County, turn east and then northeast to cut north of Kanab from which point they run an easterly course to terminate at the Cockscomb. At the same time, of course, the great southeastern escarpment of the Paria Plateau is also marked as the Vermilion Cliffs. It is not clear why Fredonia is included.

Extensive survey data exists which would bear upon the matter but much of it has only recently come to hand and there has been no opportunity to undertake the requisite ceramic analysis. There is available, however, a body of data from five excavated sites which should give a start in the quest for location of origin. The sites are the Kanab Site, 42Ws1969, located about one mile south of Kanab, Utah, three sites in Johnson Canyon which include Bonanza Dune, 42Ka1076, the Sand Hill Site, 42Ka1060, and the more recently excavated Dead Raven, 42Ka2667. Much further east at the western base of the Cockscomb is the Gnatmare Site, 42Ka1978.

The collections are summarized below in very broad categories. The tallies are limited to those traditions with accepted Anasazi associations. This means that a few sherds such as Desert Gray Wares, Southern Paiute, and even a few from the lower Colorado have been omitted. The purpose of the summary is to get some sense of the significance of the Shinarump series in each count. The grouping of these sites is not meant to suggest that no Shinarump was made south of the Arizona border. At present, the data is simply lacking.

Table II. Major Ceramic Types at Five Kane County Prehistoric Sites

The Kanab Site - 42Ka1969

Virgin Series 10,835 = 96.7%
 Shinarump Series 359 = 3.2%
 San Juan Red Ware 15 = 0.13%

Bonanza Dune - 42Ka1076

Virgin Series 8,653 = 76.0%
 Shinarump Series 2,546 = 22.6%
 Moapa Series 2 = T
 Tusayan White Ware 5 = T
 Tsegi Orange Ware 18 = 0.16%
 San Juan Red Ware 141 = 1.2%
 San Juan White Ware 2 = T

The Gnatmare Site - 42Ka1978

Virgin Series 283 = 33.0%
 Shinarump Series 152 = 18.0%
 Tusayan Gray Ware 253 = 29.5%
 Tusayan White Ware 41 = 4.8%
 San Juan Red Ware 116 = 13.5%
 Tsegi Orange Ware 12 = 1.4%

The Sand Hill Site - 42Ka1060

Virgin Series 1,949 = 52.8%
 Shinarump Series 1,733 = 47.0%
 Tsegi Orange Ware 7 = 0.19%
 San Juan Red Ware 1 = T

The Dead Raven Site - 42Ka2667

Virgin Series 2,632 = 45.9%
 Shinarump Series 3,016 = 52.6%
 Moapa Series 18 = 0.03%
 Tusayan White Ware 57 = 0.99%
 San Juan Red Ware 5 = T

To anyone who has labored among ceramic types, their associations with other types, and their areal distributions, it will immediately become apparent that the tabulations above can raise a number of questions. Even with a disciplined focus on just the Shinarump issue leaves it abundantly clear that caution is required while looking at the figures given. The Kanab Site ceramics were not subjected to examination with a microscopic analysis due to budgetary limitations (Paul Nickens: personal communication). Aikens apparently did his own analysis for Bonanza Dune and the Sand Hill Site but his published report does not appear to have discussed his methods. The present writer analyzed the sherds from Dead Raven while Patricia Wong Dean reported on the ceramics for Gnatmare. In both of the final two instances, analysis was done with 15X or 20X binocular microscopes. Even here, however, the individuals involved differ drastically in their approach to the problem.

With due caution concerning the analysis of the relevant collections, however, some tentative conclusions can be drawn. At the Kanab Site, the Shinarump portion of the ceramic collection amounts to slightly more than 3% of the total. While no one would venture to use a collection percentage as a device for determining that a given type was intrusive, it seems reasonable to assume that the Shinarump element of 3% at the Kanab Site justifies the view that the Series was manufactured elsewhere. This would become a much stronger proposition if other sites were excavated in the immediate area to produce similar collection percentages. For now, however, Shinarump may tentatively be assumed to be intrusive along Kanab Creek. This would, of course, eliminate Fredonia as a part of the center of manufacture.

The three sites excavated in Johnson Canyon seem to add a temporal dimension to the series. Shinarump accounts for 22.6% of the Bonanza Dune ceramics, 47% at Sand Hill, and 52%

at Dead Raven. Both Bonanza Dune and Sand Hill have been called late Pueblo II on the basis of the presence of corrugated pottery, which does not appear in Virgin Anasazi sites until about A.D. 1050. Without going into details, Sand Hill appears to have been occupied earlier in late Pueblo II than Bonanza Dune, although the lowest levels at Bonanza Dune may be contemporary with Sand Hill. Dead Raven, on the other hand, lacks corrugated pottery and thus must have been occupied during some part of the time between A.D. 900 and 1050. The fact that Shinarump accounts for over half of the collection is good evidence that the site was a part of both the area and temporal center of manufacture.

The Gnatmare site is very small and even greater caution is required to assess its ceramic collection. Gnatmare is late and shows a basic Kayenta architecture along with a slight predominance of Virgin and Shinarump Series pottery over that of the Kayenta. At the same time, the 18% Shinarump element in the collection shows it to be similar to Bonanza Dune. If both occupy similar temporal positions, then it can be suggested that Gnatmare is still within the central area of manufacture of Shinarump pottery.

The presence of Shinarump is confirmed for the Kaiparowits Plateau and for Fifty Mile Mountain, but the percentages tend to be small and the data comes from sources going back to the Glen Canyon project which made little use of Colton's manual even though it was available. At this writing it appears as though the percentages of Shinarump on these great mesas are so low as to argue it is intrusive to the area. The same circumstances would seem to apply to the Paria Plateau as well.

The range of Shinarump may tentatively be set at the Grand Canyon on the south and the northern edges of Kane and Washington Counties on the north. In the east it is found as far as Fifty Mile Mountain and the Paria Plateau, while its most westerly appearance is apparently the Shivwitz Plateau and the lower and middle reaches of Santa Clara Creek.

While Euler sets the temporal range at AD 1000 to 1150, good evidence argues that it is abundant by some time between AD 900 and 950. Some survey data yet to be organized for formal presentation, argues that it is present in Pueblo I and that it may occur in limited Basketmaker III contexts.

At the ceramics meeting in November, 1986, Euler attempted to argue that Shinarump was a Kayenta Anasazi Ware. In the description above, however, he has stated that it belongs to the "Anasazi Tradition." This may have been done in an effort to reduce controversy over the matter. It must be pointed out that the sites in Johnson Canyon are clearly within the Virgin Anasazi culture area as are the sites along the lower reaches of Seaman Wash, a project as yet unreported. Seaman Wash is the most easterly of the drainages flowing into the Johnson/Kanab Creek drainage system and it runs south at a point roughly midway between Johnson Canyon and the Cockscomb.

In the early fall of 1988, Dalley and McFadden returned to Seaman Wash to continue the survey further north towards the Vermilion Cliffs. They have told this writer that they have begun to find sites with both Virgin and Kayenta Anasazi structural forms. Their initial impression is that there is no corresponding difference in the ceramics which appear to continue in the Virgin

and Shinarump traditions. If both series continue to dominate in this area of mixed architecture and without a significant increase in Kayenta ceramics, then Shinarump must clearly continue to be regarded as a Virgin Anasazi Series. If, on the other hand, it should be found that Virgin Series ceramics decline in the face of an increase in Kayenta sherds while Shinarump counts hold fairly constant in given temporal contexts, then Shinarump might be considered diagnostic of the transition from Kayenta to Virgin Anasazi.

At this writing it seems to be apparent that Shinarump is the easternmost of the three Virgin Anasazi ceramic series. As such, it may be expected that it would be abundant at the point of cultural transition without being less Virgin Anasazi for that fact. Further light may be shed on this matter with some fairly intensive surveys in the little known area between the Cockscomb and the western base of the Kaiparowits Plateau.

No detailed discussion of the Virgin Series need be offered at this time since the Colton manual as modified by this writer in the report of excavations at Quail Creek (Walling et al. 1986) covers the matter fairly well. Of interest at this point, however, is the matter of the rim profiles and the painted designs recovered during the Dead Raven excavation and presented on the accompanying plates.

The jar rim profiles and the painted designs are overwhelmingly Pueblo II material and the absence of corrugated pottery makes it evident that they represent early Pueblo II, i.e., that they must date from approximately A.D. 900 to 1050. Nearly all of the rim sherds show the fully everted lip that is the hallmark of Pueblo II. The only exceptions might be rim No. 30 which has the characteristics of a Basketmaker III rim and perhaps rim Nos. 31 and 53 which approach the moderate eversion of Pueblo I.

The great majority of the painted designs are clearly in the St. George Black-on-gray tradition, which is analogous to Black Mesa Black-on-white of the Kayenta. A few comments are in order, however. Sherd A might be regarded as a transitional form between Washington Black-on-gray and St. George Black-on-gray. The checkerboard is characteristic of St. George but the small 'flagging' is quite common in Washington designs.

The most distinctive feature found in all of the illustrated designs is the use of the elongated triangle. This will not be found in Colton's illustrations of St. George Black-on-gray, nor has it been common in collections previously examined from Mohave County, Arizona and Washington County, Utah. The present writer first encountered it during the analysis of the ceramics from the Red Cliffs Site (Dalley and McFadden 1985). In that instance, three possibilities existed. It could have been from Basketmaker III, Pueblo I, or early Pueblo II. Given the absence of corrugated sherds at the site, it could not come from a later date. The process of elimination forced the triangle into St. George, although this writer was uncomfortable with the choice. The abundant use of the elongated triangle in the Dead Raven painted ceramics makes it fully evident that, for some potters, at least, it is a common component of St. George Black-on-gray. The triangle is seen in the accompanying plates on sherds B, F, G, K, N, Y and Z.

A few designs beginning with BA and extending through BQ do not fit in the St. George

Black-on-gray group. BD, BE, BJ, BK, and BL could well represent Mesquite Black-on-gray, a form from the Basketmaker III tradition. BA, BB, BC, BG, BM, and BQ are best seen as falling within the Pueblo I Washington Black-on-gray category. Finally, the only Shinarump painted sherd collected was BR, best viewed as the equivalent of St. George Black-on-gray.

In Figures 15, 16, 17, and 18 which follow, the basic design factors of Dead Raven ceramics are evident. Fig. 15 is concerned exclusively with cross sections or profiles of the rims of both jars and bowls. In all cases, the exterior of the vessels is at the right. The most obvious fact is the absence of design differences between the Virgin and Shinarump Series. There is, as already suggested, some slight evidence of change through time but this would require a collection from a multi-component site to become clear. The rim profiles are identified as follows: North Creek Gray jars: 1-29. Shinarump Plain jars: 30-46. Shinarump Vitrified jars: 47-69. St. George Black-on-gray bowls: 70-102. Hildale Black-on-gray bowl: 103. Unidentified Virgin Series Black-on-gray bowls: 104-113. North Creek Gray Bowls: 114-120. Wygaret Black-on-gray bowl: 121. Shinarump Plain bowl: 122. Vittrified Shinarump bowl: 123.

Fig. 16 is given entirely to examples of painted designs on St. George Black-on-gray rim sherds.

Fig. 17 includes St. George Black-on-gray rim sherds: Y-AF. Additional St. George painted sherds AG-AZ. BA and BB are rim sherds of unidentified designs.

Fig. 18 shows more unidentified Virgin Series rim sherds BC-BL. Additional unidentified Virgin designs are BM-BO. Anomalous late designs are seen on BP and BQ. BR is the only painted Shinarump design recovered.

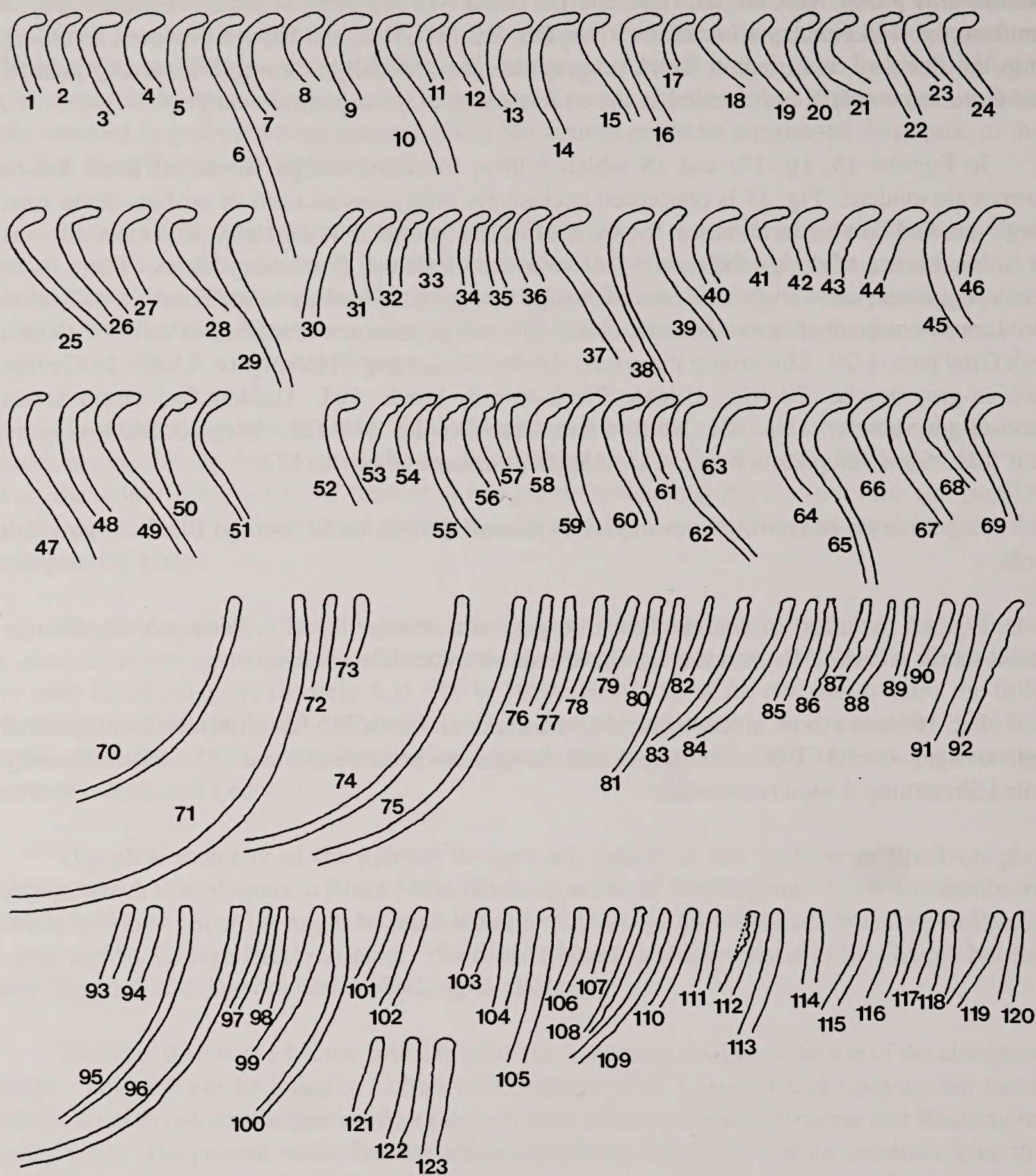


Fig. 15. Ceramic rim profiles. North Creek Gray Jars: 1-29. Shinarump Plain Jars: 30-46. Shinarump Vitrified Jars: 47-69. St. George B/G Bowls: 70-102. Hildale B/G Bowl: 103. u/i Virgin Series B/G Bowls: 104-113. North Creek Gray Bowls: 114-120. Wygaret B/G Bowl: 121. Shinarump Plain Bowl: 122. Shinarump Vitrified Bowl: 123.



Fig. 16. Painted sherd designs. St George B/G Rim Sherds: A-X.



Fig. 17. Painted sherd designs. St. George B/G Rim Sherds: Y-AF. St. George B/G: AG-AZ.
u/i Virgin Series B/G Rim Shers: BA-BB.

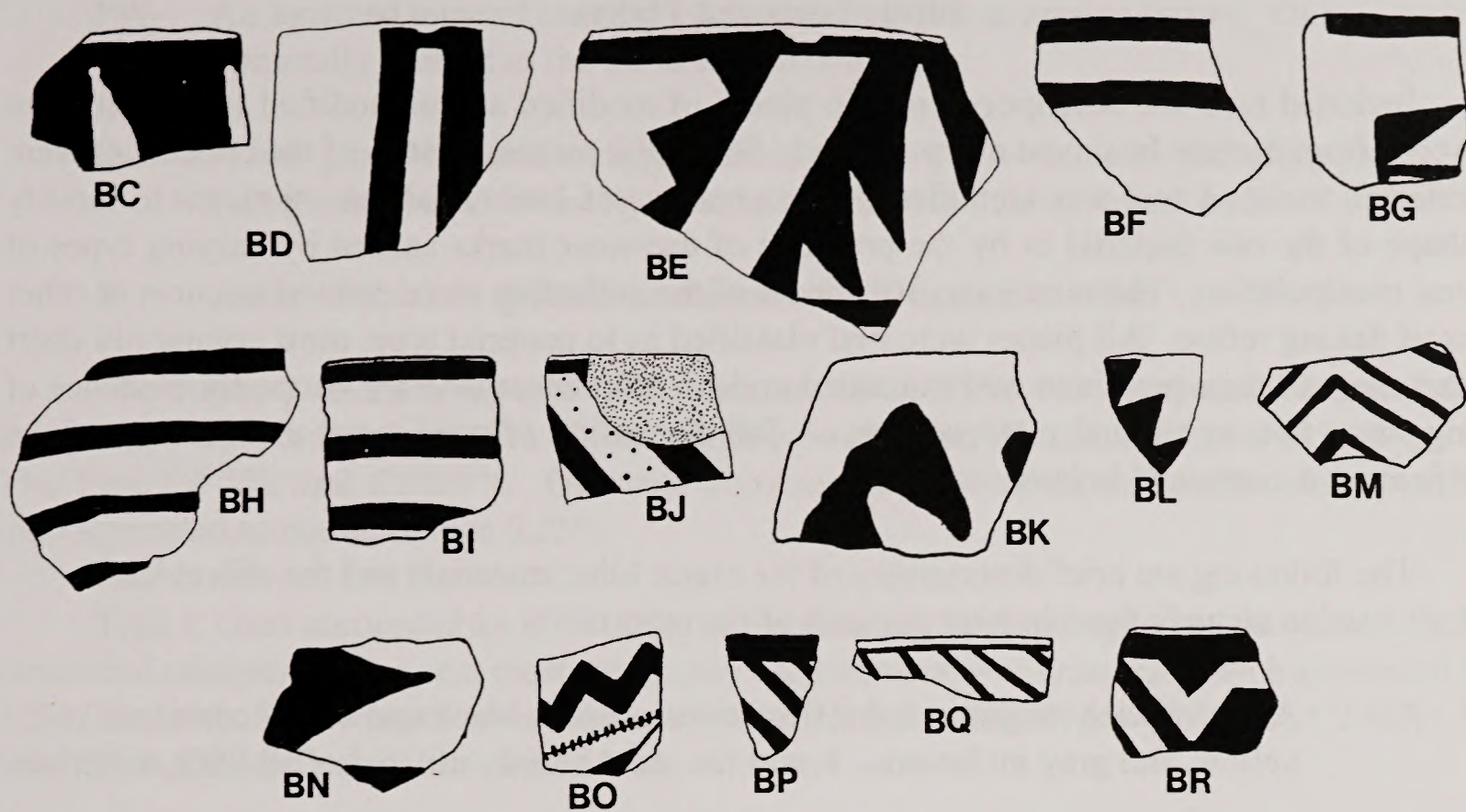


Fig. 18. Painted sherd designs. u/i Virgin Series B/G Rim Sherds: BC-BL. u/i Virgin Series B/G: BM-BO. Hildale B/G Rim Sherds: BP-BQ. Wygaret B/G Rim Sherd: BR.

Lithic Tools and Flakes

Included here are descriptions of 656 pieces of modified and unmodified stone that were recovered from the site in almost every context. Some 300 pieces, or 46% of the collection, were classified as tools. A tool was identified by the presence of intentional flaking meant to modify the shape of the raw material or by the presence of use-wear marks caused by varying types of cultural manipulation. The remaining 365 pieces of the collection were defined as cores or other forms of flaking refuse. All pieces were first classified as to material type, most commonly chert or quartzite, and then each item was examined under a 15x binocular microscope for evidence of flaking stage, use, or cultural manipulation. A full discussion of typological divisions and flake classification is contained in later sections.

The following are brief descriptions of the major lithic materials and the abbreviated symbols used to identify them in later portions of the report:

- C - A chert which ranges in color from translucent to black and which contained red, yellow, and gray inclusions. It was the most heavily utilized of all lithic materials.
- C2- Primarily an opaque gray but also includes blue-gray and gray-brown varieties. This was the third most popular variety.
- C3- An opaque white chert with occasional gray inclusions. The second most widely utilized form.
- C4- A chert variety including color combination of gray and pink along with some white, tan, and orange.
- C5- An opaque white chert with green inclusions. Only a few pieces found in the lithic collection.
- B- A fine grained gray to black basalt, occasionally vesicular, available in local alluvial deposits.
- CQ- A solidified material made up of fine grained chert and quartzite which are melded together.
- D- Diorite, an igneous rock generally gray in color and containing quartz and feldspar. Available in local alluvial deposits.
- L- A fine grained, gray or tan solidified lithographic limestone.
- LQ- A mineral variety composed of quartzite and limestone cemented together.
- LS- Lithographic limestone and sandstone cemented together.

- PW- An agatized mineral ranging in color from white to gray to brown. Only minimally present in the Dead Raven collection.
- Q- A fine-grained quartzite ranging from gray to yellow but also including some purple and green. Probably found as cobbles in nearby stream bed.
- S- A fine to coarsely grained sandstone usually orange in color.

The majority of the recovered lithic material, some 85%, was composed of chert. One variety, Type C, accounted for 50% of the collection with Type C2 accounting for 11%, Type C3 17%, Type C4 5%, and C5 0.5%. Quartzite accounts for 16% of the collection while petrified wood amounted to not more than 0.25%.

Type C chert accounted for 60% of the tool collection, dominating in both the modified and unmodified categories. The next most commonly used material was Quartzite which accounted for 13% of the total. Following the two most used materials were chert Types C3 (12%), C2 (9%), C4 (5%), C5 (0.5%) and petrified wood (0.5%).

Cortex present in waste flakes of various chert varieties ranged from 23% to 45%. In the case of quartzite waste flakes, however, cortex was found on over 50% of all flakes, perhaps because of the use of local stream cobbles as the major materials source. Type C chert is similar to the type found in the Petrified Forest member of the Shinarump Formation at the base of the Vermilion Cliffs and at points along the Virgin River. 45% of C2 chert flakes exhibit cortex, suggesting that the material may be of local origin even though it was only the fourth most frequently used mineral.

A total of 300 lithic tools were identified. Tools were divided into two groups. The first involved items that had been manufactured by flaking to the desired form while the second group was made up of those formed by incidental use. Projectile points, various biface forms, drills, and some scrapers made up the first class, while utilized flakes, cobble and core scrapers, hammerstones and edge pounders made up the second group. All tools were classified according to traditional typologies and by identification of morphological and visible functional attributes.

Projectile Points. Projectile points are those artifacts that have been bifacially modified to a pre-conceived design. Those forms usually exhibit two elements. The first is a large blade which is the piercing portion of the implement, while the second is a hafting element which takes on the form of a basal stem or modification of the blade base. The two major kinds of points are dart points and arrow points. These are distinguished largely on the basis of size and morphological differences. Arrow points can, in addition, be distinguished by the presence of pressure retouch flaking, low ridge angle range, and by their relative thinness.

Basic differences between dart and arrow points do not imply that the two forms had no temporal overlap. A good illustration is seen in the fact that the Elko Series dart points are often found associated with Post-Archaic assemblages throughout the Virgin Anasazi area. A total of

10 projectile points were recovered during the Dead Raven excavation and all but one are arrow points.

The single dart point is an Elko Corner-notched made of C2 chert (Pl. 12a). It was found in the upper level of Stratum 2 on the west side of the road. The point is crudely worked, and is not thinned. One tang is missing. The margins are slightly concave and they show edge angles ranging from 28 to 46 degrees. The notches have been ground. The point is 32.9 mm long by 24.0 mm wide and 4.9 mm thick.

A Rose Spring Corner-notched point (Pl. 12g), composed of C3 chert, was found in Trench 4. Some believe that this form was the first arrow point to occur in the Intermountain West. Data on the type indicates its first appearance in southern Utah at Cowboy Cave about A.D. 350 and it continues in the area until A.D. 900 (Holmer and Weder 1980:67). The points are slender with parallel-sided or expanding stems.

Abajo and Eastgate Expanding Stem points are similar in morphology to the Rose Spring Corner-notched variety but the former appear to be localized types. The Rose Spring point recovered at Dead Raven has been crudely worked and thinned and the tip is missing. The point is 14.8 mm wide with concave margins. It varies from 3 to 5 mm thick and the lateral edge angles range from 45 to 55 degrees.

Five of the eight morphologically distinctive points were classified as Abajo (Pl. 12b-f). They range from complete specimens to basal fragments. The Abajo point is defined by its long pointed tangs and a narrow stem which usually extends well below the ends of the tangs. The Abajo is similar to the Rose Spring variety but Abajo points are found only in Anasazi association, while Rose Spring points are known over a much wider area including the Great Basin and the northern Colorado Plateau. Four Abajo points were found in Pithouse 1 with two from the fill and two from the floor. One of the specimens is a basal fragment which lacks the stem and is composed of C chert. It has been thinned and there is edge grinding on the margins and in the notches. The other Abajo from the fill is slightly more complete though lacking the upper portion of the blade. Made of C chert, it has been well worked and thinned and the margins are slightly concave. The edge angles range from 25 to 27 degrees.

The two points recovered from the floor are nearly complete although one lacks the stem, apparently the result of hafting fracture. Both are also made of C chert and both exhibit edge grinding on the margins and along the basal notches. The complete specimen is 27.9 mm long and 13.0 mm wide and it is 3.0 mm thick. Lateral edge angles vary from 31 to 42 degrees. The slightly incomplete point is 29.2 mm long and 3 mm thick, with edge angles of from 33 to 46 degrees. Both points have been finely worked and thinned and each exhibits concave margins.

The final Abajo is a small, poorly worked specimen made of C2 chert. It has not been completely thinned but it does show bifacial retouch along the margins. It has a much shorter blade than most Abajo types, measuring 20 mm long and 14.9 mm wide while it is 4.6 mm thick. Margin angles range from 40 to 58 degrees.

An Eastgate Expanding Stem point, missing one tang, the stem and tip, was found in Fill 2 of Pithouse 2. Eastgate points are identified by parallel sided basal notches and by the fact that they are only slightly longer than they are wide. These are a regional form most commonly found in the northeastern Great Basin. The specimen from this site has been well worked but the intact margin angle varies from 40 to 47 degrees and it is 3.3 mm thick. It is also made of C chert.

Parowan Basal-notched points are defined as those formed on a narrow isosceles triangle with small notches flaked into the straight base to create a small stem (Pl. 12h). The point type has been relatively dated from A.D. 950 to A.D. 1150 (Holmer and Weder 1980). The single point of this type was found in the Pithouse 1 fill although the type is more common in Virgin Anasazi sites further west. The point is actually a dominant form in the Parowan Fremont which produced a heavy concentration of sites in central Iron County. Made of type C chert, the specimen found at Dead Raven is nearly complete but it lacks a small part of the tip, one tang and most of the stem. The point is finely worked and exhibits edge grinding along the margins and in the remaining notch. Its maximum length is 34.2 mm while it is 18.3 mm wide and 3.8 mm thick. The edge angles range from 36 to 40 degrees.

A point basal fragment of C3 chert was recovered in Stratum 2 in Pithouse 2. It appears to have been a side notched point with an expanding stem. Nothing further can be said about the specimen except that it is finely worked.

Bifaces. Bifaces are artifacts which exhibit hard-hammer, soft-hammer, and/or pressure flaking on both surfaces of flakes that have, in most instances, been struck from prepared cores. A total of 22 bifacially modified artifacts were found. Included are knives, projectile point preforms, biface fragments, tools, and flakes.

Knives are bifacially modified tools which exhibit pressure retouch on the margins and surfaces of completed artifacts. They may or may not have been hafted but, in either instance, they were used for cutting or slicing a variety of materials. In some cases, the margins may have a ground appearance that suggests contact with more resistant substances.

Five knives, four complete and one fragmentary, were recovered (Pl. 12 i, j). One of the complete specimens is C2 chert and came from Cist 1 fill. It has been finely worked and the lateral edge angles extend from 41 to 48 degrees. The base and one margin are excurvate. Both margins exhibit use in the form of edge grinding. The base has very slight tangs, suggesting that the knife may have been hafted. It measures 59 mm long and 28.5 mm wide and 4.5 mm thick.

The remaining three knives are more carelessly worked and all are of C chert. One has a tear-drop shape and shows wear polish along one margin. It was recovered from the Work Room floor and measures 45 mm long by 23 mm wide with a thickness of 8 mm. The other knives were both recovered in the fill of Pithouse 1. One is a small tool showing slight edge grinding and crushing along both margins. The edge angles of the margins range from 41 to 54 degrees. It is 31 mm long and 20 mm wide and 7 mm thick. The final knife is a fragment which exhibits slight wear polish on the remaining segment of the margin. Edge angles run from 45 to 50 degrees.

Arrow point preforms signifies a category which consists of those bifacially modified artifacts showing pressure retouch along both margins and surfaces with edge angles ranging from 44 to 59 degrees as identified during the Quail Creek Project (Walling et. al. 1986). One complete and one fragmentary example, both of C chert, were found at Dead Raven.

The complete preform is lacking the tip but it measures 29.6 mm long by 18.5 mm wide and 8mm thick. Edge angles range from 43 to 44 degrees. The preform was found in Stratum 2 midden overlying Pithouse 1. The fragmentary specimen represents the basal corner of the original artifact which was found in the fill of Trench 4.

The *biface fragments* category includes seven basal fragments and three bifacially worked fragments which may originally have been part of knives, preforms, or other tools. Four of the basal fragments are made of C3 chert, two are C4 and one is C2 chert. All but one were found in fill contexts; the exception came from the Work Room floor. The basal edges range from concave to flat to convex with the convex alignment dominating. Five show evidence of use along remaining margins with the use varying from slight wear polish to crushing. The other two exhibit low edge angles and they may thus have been point preforms.

Two of the remaining three fragments were taken from the Work Room fill and the other was found in Stratum 2 midden in the site area west of the road. One of the specimens is a somewhat ovate knife fragment exhibiting use wear on one margin. It is made from C chert. The other specimen from the same provenience, made of C3 chert, is triangular and crudely worked although it showed no evidence of use. The final specimen is a rectangular piece of C2 chert which lacks the upper portion. It has been indifferently worked and there is no evidence of use along the margins. This may be a preform fragment.

The *Miscellaneous Bifaces* category covers four bifacially modified artifacts, including a tool and three flakes of unknown use. The tool is a roughly worked C chert core flake which shows limited use along both margins. It was found on the use surface near exterior Hearth 2. The remaining flakes, two made of C chert and one of C4, were all found in fill. Two display use along modified edges while the other is quite fragmentary.

Drills. Drills are characterized by a bifacially flaked bit with a roughly diamond-shaped cross section. Wear is distinguished by coarse edge damage and striations formed at right angles to the bit edge. The rounded aspect of the edge damage near the tip indicates that the tool was used in a rotary motion on hard substances. The tools may either be hafted or hand held, with the handles being either flaked or simply the unworked remainder of the flake.

Three drills and one bit fragment were found in the collection. One, made of C4 chert, is somewhat cylindrically shaped with a slightly tapered base. Evidence of crushing is present along the bit which makes up most of the artifact, and the tip is blunt. The drill measures 40.8 mm long while the width varies from 5.8 to 9.1 mm. The second drill is a small flake which shows a retouched, naturally formed bit. The material is C chert and the tip has been snapped off. Both this and the first drill were recovered from Pithouse 1 fill. The final drill is a tear-drop-shaped piece of C3 chert found in room fill. It is crudely worked bifacially and it has a wedge-shaped bit which has

been crushed from use. It measures 28.9 mm long and from 3 to 14 mm wide and 9.3 to 11.7 mm thick. The drill bit fragment, formed of C2 chert, was found in Stratum 2. It is a finely worked bit mid section which shows crushing along the edge.

Scrapers. Scrapers are defined as a flake or cobble fragment which exhibits unifacial retouch forming a steep angle along the working edge. Either use retouch and/or wear polish may be present. At Dead Raven, four chert and four quartzite scrapers were identified.

The four chert scrapers are simply modified flakes which show use along one or more edges. All were found in fill contexts. Two exhibit semicircular or concave use edges while the other two were straight-edge scrapers. In addition, one of the straight scrapers showed some definite bifacial retouch along a second edge. Slight wear polish and edge grinding on that margin argue that it was used as a knife. Two of the scrapers were made of C2 chert, one is C chert, while the other is C3. The quartzite scrapers are all made of larger cobble fragments (Pl. 12k). In all cases, one edge had been unifacially flaked and the use edge has become rounded from use.

Utilized Flakes. The Utilized Flake category consists of flakes which were either not suitable for further manufacturing or were struck for shaping a core or other incidental usage. The flakes exhibit use retouch along one or more edges which suggests that they were used for cutting or scraping hard materials such as wood or bone. Some specimens also show wear polish or edge grinding, indicating the variety of uses which the flakes could serve.

Also indicated within this category are flakes identified as graters. These take the form of small, intentionally or naturally formed sharp projections that have been used in either a rotary or linear motion. Graters were probably used on a variety of materials including wood, bone, or shell.

A total of 236 utilized flakes were found in the lithic assemblage, making up 79% of all tools. Some 68% of the utilized flakes were C chert followed by C3 and C2 chert, quartzite, type C4 chert and C5 chert, in decreasing order of frequency. A number of the flakes, 35% of the total, used natural protuberances as graters.

Cores. Cores are remains of pieces of suitable stone from which flakes have been struck. Only nine cores were found at Dead Raven, although a number of core fragments were classified as utilized flakes. Of the nine, only 3% of the total debitage collection, five are C chert, three are C3 and one is C2. As type C chert is the dominant variety of utilized stone, it is natural that more than half of the recovered cores were of this material.

Debitage. The category of Debitage holds a total of 345 pieces of lithic waste collected during the excavations. This included biface flakes, core flakes, core shatter flakes, and unidentified flakes. The first two categories include those flakes with identifiable striking platforms while the latter two types lack this feature. Core shatter flakes are those angular pieces of stone which are removed during core reduction.

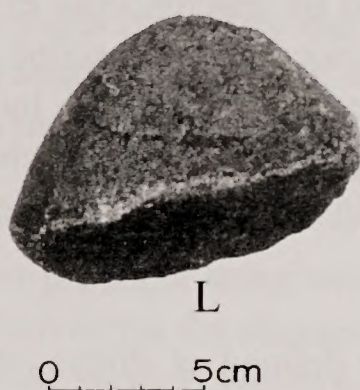
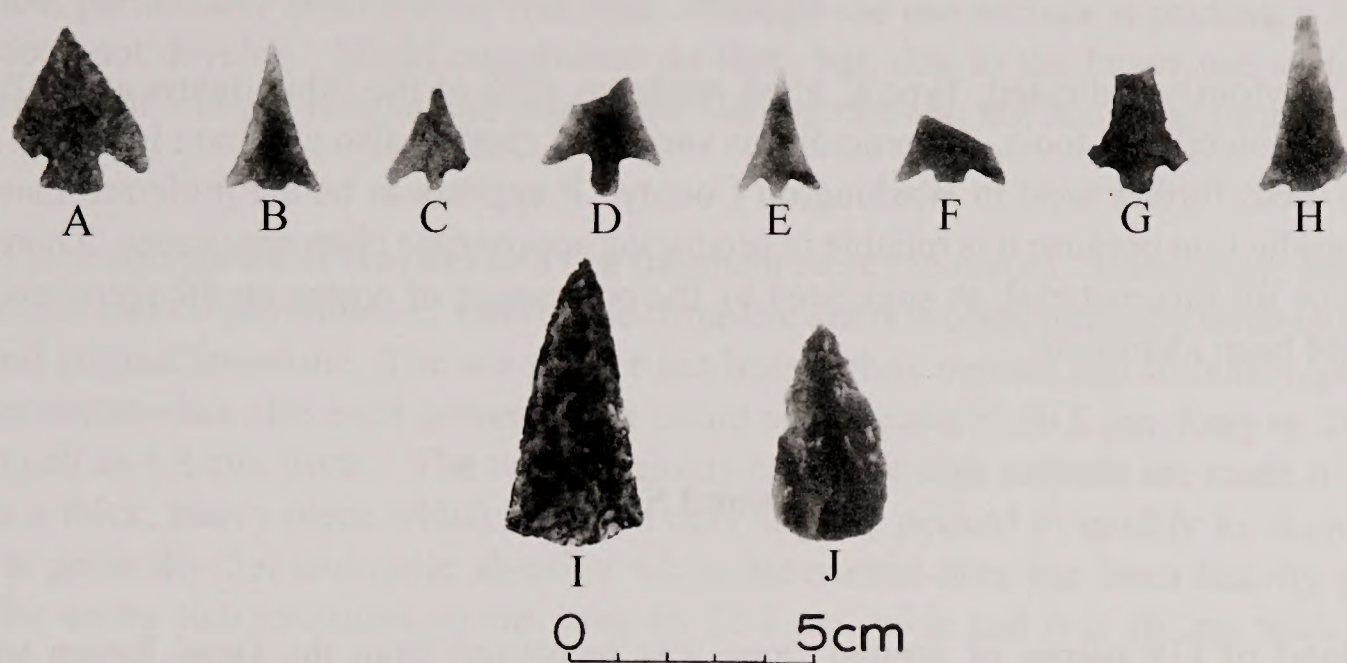
Core flakes and biface flakes are the dominant waste types, 50% and 22%, followed by unidentified flakes (20%) and core shatter flakes (5%). Typically, the majority of the debitage (42%) and each flake category (32% to 68%) were made up of C chert. In decreasing order of frequency, C3 chert (20%), quartzite (18%), C2 chert (20%), C4 (6%), and C5 chert (1%) account for the balance of the collection. Cortex was most frequently found on quartzite (57%) and type C2 chert (45%), followed by C4 (33%) C (28%) and C3 (23%). Quartzite cobbles were probably available in Johnson Wash just a few meters east of the site, while types C2, C4, and C chert may also have been found close at hand.

Miscellaneous Materials. Miscellaneous materials is a residual category that includes three stone and mineral fragments not described elsewhere. One is an obsidian flake which contains inclusions of a blue-green solidified material and sand. The flake shows no evidence of use. The second specimen is an eroded nodule of green-blue material which contains sand inclusions. Both were recovered from fill. The final sample involves a number of pieces of blue azurite, all less than 1 mm in diameter. All of the fragments were found in the lower fill of Cist 2.

Discussion. Some 46% of the lithic assemblage could be classified as tools, although 79% of the tools were utilized flakes. This suggests that simple expedient tools were more important than tools requiring the investment of greater time to prepare. It is also possible that the finely worked tools were taken care of and more carefully curated. This would explain their limited number at the site. In general, the lack of carefully worked lithics at Virgin Anasazi sites is common as is the dominance of utilized flakes in the tool assemblage. In addition, the number of bone tools (see below) recovered from the site suggests that bone was at least as important as stone.

The variety of tools found at the site, including projectile points, bifaces, knives, drills, and scrapers, implies that a wide range of activities took place. Bifacially modified tools dominate the finished stone tools, accounting for about one-third of the assemblage that excludes utilized flakes. The next most numerous tool types were unmodified edge pounders and then projectile points. The points, along with the amount of modified and unmodified bone, suggest that hunting was a significant part of the economy at Dead Raven. The presence of Rose Spring, Abajo, and Eastgate points are generally associated with Pueblo I occupations in the Virgin Anasazi area although they may also occur in early Pueblo II contexts. Parowan Basal-notched points are found in Pueblo II contexts but only a single specimen was recovered at Dead Raven. The points in this collection may imply a transitional Pueblo I- II or a very early Pueblo II occupation. The radiocarbon dates of A.D. 830 +/-70 and A.D. 940 +/-60 support either thesis.

The assortment of lithic debris seemingly indicates that a wide variety of core reduction and tool production was done at the site. No definable lithic work areas were found, and most of the debris was found in fill contexts. However a core and a few biface flakes and core flakes were recovered from the floor of Pithouse 1, suggesting that these activities were occurring in domestic situations. Small amounts of micro-refuse were also observed in flotation samples from both Pithouses 1 and 2 and their hearths. Micro-refuse was also recovered from the fill of the Work Room hearth, validating the functional name given the structure. Micro-refuse was also found in Stratum 2 midden and on the floor of Cist 1.



Pl. 12. A, Elko Corner-notched point; B-F, Abajo Points; G, Rose Spring Corner-notched point; H, Parowan Basal-notched point; I-J, Knives; K, Cobble scraper; L-M, Edge pointders; N, Basin metate; O, Slab metate.

As previously indicated, Type C chert made up 42% of the lithic debris and 60% of the modified and unmodified tools. In general this variety of chert is also common in Virgin Anasazi sites in the areas further west in Washington County. It appears to be the preferred material for lithic tool production because it is reliable in producing appropriate cleavage planes. There may be a local source for this material, as suggested by the percentage of cortex on the recovered debris, but it has not been identified.

Ground Stone

A total of 118 pieces of ground stone was recovered from the Dead Raven site. The artifacts were divided into types on the basis of each specimen's morphological and technological attributes. They were then assessed by macroscopic examination, by low-power magnification, and by occasional use of a 15x binocular microscope. In addition, artifact classification and description was directed by the typology devised by Woodbury (1954) and previous work conducted by the author. The principle artifact types include several forms of metates and grinding platforms, abrading stones, polishing stones, edge grinders, hatch covers, disks, and ground stone fragments.

Basin Metates. Basin metates are defined as stones on which materials have been ground in a back-and-forth motion which, in turn, forms an ovoid to rectangular basin or trough in the surface of the slab. The utilized slab is frequently modified by pecking and grinding, while the grinding area is initially prepared by pecking in order to form an abrasive use surface. Once the basin has been ground smooth, it is repecked to maintain its abrasive qualities.

Two complete and 11 fragmentary basin metates were recovered during the excavation. All but one fragment from the floor of Pithouse 1 were found in fill contexts. The two complete basin metates were both made of sandstone. The larger specimen exhibits a slightly concave basin which utilizes most of the upper surface, and is adjacent/open to one end of the utilized stone (Pl. 12 n). The entire metate measures 33.5 cm. long by 18.8 cm. wide and it is 9.4 cm. thick. The smoothly ground basin is 30.5 cm. long and 16 cm. wide and 3 mm deep. The slab itself has been modified both by pecking and by grinding. The other complete basin metate is a smaller rectangular piece of stone with the use surface adjacent to one side and the end. The basin is on a slant and, although the shape of the utilized stone has been modified, it is flawed and rough. The entire implement measures 14 cm. long by 9 cm. wide while it is 5 cm. thick and the roughly round basin is 9.15 cm. long and 7.2 cm. wide with a maximum depth of 5 mm.

Ten of the basin metate fragments were composed of sandstone and one is diorite. All fragments exhibit some portion of the basin, including ends and laterals, and all of the utilized stone has been pecked and/or ground to modify its natural shape. In addition, two of the fragments have been used on both surfaces.

Slab Metates. Slab metates are defined as grinding platforms which use most of the upper surface

of the side, particularly from end-to-end, and, although the use surface is pecked, a full basin or trough does not develop. Slight concavities do form but, due to the larger use surface and the presumed use of a larger two-handed mano, the slab metates do not show the pronounced trough or basin form.

Three complete slab metates and one fragment were recovered. Three come from Pithouse 1 fill and one had no provenience. One of the complete slabs is composed of a rectangular piece of flaked and ground limestone. The use surface has been lightly pecked and smoothly ground while the lower surface has also been ground. The entire slab measures 30.6 cm. long by 20 cm. wide and as much as 3.3 cm. thick. The two remaining complete slab metates are made of sandstone. One was a thick, heavy piece which has been only slightly pecked to modify its shape. The use surface is generally flat and quite abrasive while the central area has been heavily ground (Pl. 12o). The entire slab measures 46 cm. long by 23.5 cm. wide and it is 10 cm. thick. The final complete specimen utilized an irregularly shaped piece of sandstone which has been used on both surfaces. The upper surface, which places the implement in the slab category, is smoothly ground, particularly towards the center, so that a slight concavity has been formed. The lower surface is flat but ground while two heavily pecked areas suggest that it was also used as a crushing platform. The fragmentary slab metate includes an intact end of the utilized surface which has been ground flat on a natural longitudinal incline.

Grinding Slabs. Grinding slabs are tabular pieces of stone which exhibit grinding on a surface but which lack the pecking and re-pecking which forms the abrasive surface on metates. Consequently a well-defined basin does not form on the use surface, which usually covers most of the upper area, although occasionally a slight concavity may result. The lack of pecking modification on the use area suggests that a less abrasive surface was desired, possibly for crushing softer materials.

Three complete grinding slabs and four fragments, all of sandstone, were found in fill contexts during the excavation. All three of the complete specimens have been modified to some degree by pecking and abrading. Two are fairly large, measuring 17.2 to 22.5 cm. long by 12.5 and 25.3 cm. wide. One shows bifacial use. The other complete specimen exhibits a groove, 3 to 3.5 cm. wide, running down one side of the slab. It appears to be the utilized portion of the artifact. The groove has been ground but it is only 2 mm deep.

Three fragmentary grinding slabs exhibit modified edges and ground use areas. Two have been bifacially used and one has a red ochre stain on a corner. The remaining fragment is heavily covered with red ochre on the apparent use surface.

Grinding and Abrading Platforms. Grinding and abrading platforms show ground or abraded use surfaces on irregularly shaped pieces of stone. Of the three found, two were made of limestone and the other of sandstone. The sandstone specimen appears to have been a part of a larger grinding slab which was also used in its present form. The upper surface is heavily stained with red ochre while the lower surface exhibits possible use and a suggestion of red ochre stain. The stone measures 10.1 by 7.4 cm. One of the limestone platforms may once have served as a core, and a resulting surface appears to have been ground. It shows slightly diagonal longitudinal striations on a slanted surface and it does not appear to have been heavily used. The stone is 21 by 14.3

cm. The remaining artifact exhibits natural concavities on the upper surface, and the larger of the two has definitely been used. The utilized stone has not been modified and the use area is near the stone's edge on three of its four sides. The area has been smoothly ground and it measures less than 2 mm deep.

Shaft Smoother. A single shaft smoother is an irregularly shaped sandstone slab exhibiting two distinct and one barely visible grooves on its upper surface (Pl. 13 a). The two well-defined grooves are roughly semi-circular in cross-section, measuring 17.9 and 19.0 cm. long, while each is 7 to 9 cm. wide and 6 mm deep. The surface surrounding the indistinct groove, which is 11.5 cm. long and 9 mm wide and 1 mm deep, has been smoothly ground. The presence of the grooves implies that the artifact was used for forming and/or finishing implements such as arrow shafts. The slab on which the grooves are found measures 22.2 cm. long and 14.5 cm. wide and is 6.5 cm. thick.

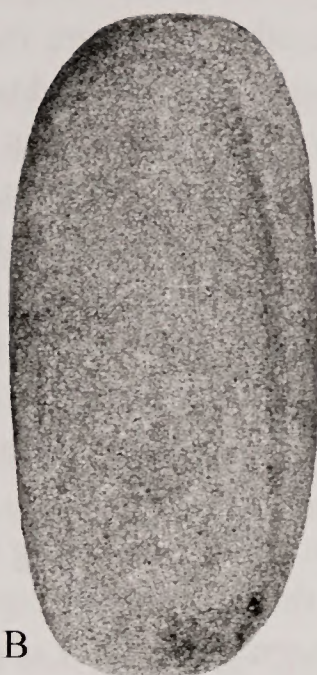
Manos. Manos are defined as tabular pieces of stone which are held in the hand(s) and used in a reciprocal motion on a processing/preparation platform such as a metate or grinding slab. They are used for processing plant and other material, including pigments. Manos are either one or two handed, modified or unmodified stones or cobbles which have been used either unifacially or bifacially. Modification generally refers to the shaping of the stone, including rough unifacial and/or bifacial flaking or pecking and abrading along the laterals and ends. On the majority of the specimens found at Dead Raven, the use surface was initially pecked so that it would be more abrasive. Repecking also occurs in some specimens to maintain the abrasive surface after use has ground it smooth. Naturally coarse or vesicular stones such as sandstone, basalt, or diorite were frequently used to minimize the need for continual repecking of use surfaces.

In addition, use on basin metates and grinding slabs tends to form mano wear patterns distinctive to the use. A flat surface produces a flat use surface, while use within a well-defined basin often causes beveling of the ends of the mano. End beveling occurs more frequently on larger tabular manos, since the smaller cobble manos fit within the basins and beveling is not as common. Another wear pattern results from a specific grinding motion which forms a lateral bevel. The person using the mano raises the far edge at the beginning of the down stroke to allow the material being processed to gather under the stone. While doing this, additional pressure is applied to the near edge which causes the beveling. This wear pattern can occur while using either a basin metate or a flat grinding surface.

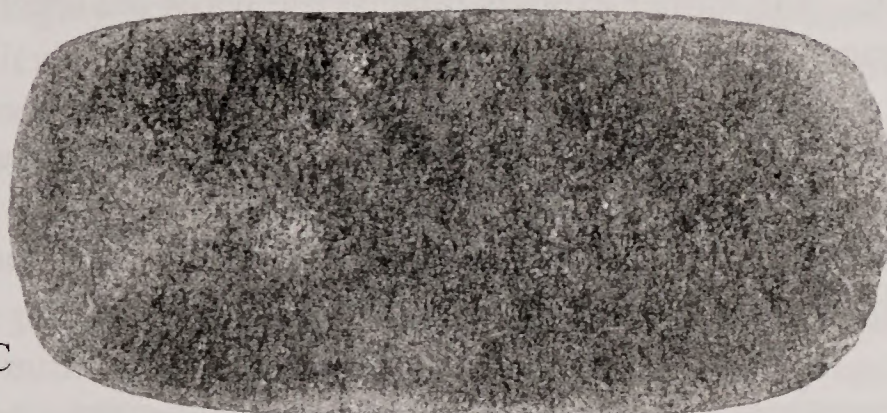
Seven complete manos and ten mano fragments were recovered during the excavation. Twelve were classified as two-handed manos, of which eight were unifacially used, and the other four showed bifacial use (Pl. 13 b-d). Two of the bifacial specimens are complete and two are fragmentary while all four were made of sandstone. One of the complete manos has been unifacially flaked on the ends while all four exhibit pecking and abrading modification. All of the artifacts show heavier utilization on one of the two surfaces. One of the complete specimens exhibits end-to-end beveling while the other three show slight lateral beveling. The two complete manos are 17.3 and 23.0 cm. long by 5.5 and 10.15 cm. wide and 3.4 and 3.0 cm. thick, respectively.



A



B



C



D

0 10cm

Pl. 13. A, Shaft smoother; B-D, Two-handed manos.

Of the eight unifacially used, two-handed manos, three are complete and five are fragmentary. All of the complete specimens are sandstone. One was found on the floor of Pithouse 1, while the other two were from fill contexts. The first specimen is a loaf-shaped, modified stone which shows both slight end wear and lateral beveling. Another of the complete manos of this type is generally peanut shaped in overview. It has only been slightly modified and it exhibits some end-to-end beveling. The final complete implement is an elongated oval, tabular piece of stone which has been pecked, abraded, and flaked in order to modify the shape. The use surface is flat and smoothly ground. The three manos vary from 21.8 to 25.2 cm. long and from 9.1 to 11.2 cm. wide and from 4.5 to 4.6 cm. thick. Two of the unifacially used fragments are made of sandstone, two are quartzite and one is a limestone/sandstone conglomerate. All of the fragments have been pecked and abraded along the edges and two show slight end beveling.

Four of the remaining seven items are small, one-handed cobble manos. Two are complete and one of these is made of quartzite and one is limestone. Two exhibit limited modification and they have been unifacially used. They range from 10.2 to 14.5 cm. long by 7.8 and 9.8 cm. long and from 5.5 to 4.0 cm. thick. One of the fragmentary manos of this type is made of sandstone and the other of quartzite. The former exhibits bifacial use while the latter is a unifacially used, unmodified cobble fragment.

The remaining three mano fragments were too incomplete to be placed in any of the type designations. One is a small, bifacially used basalt fragment which shows modification on the remaining end. The other two fragments are unifacially modified sandstone artifacts which have been heavily used. Both show lateral beveling.

Hammerstones. Hammerstones are typically small, hand-held cores or cobbles which show varying amounts of battering on natural prominent points. Their oval to circular attrition areas distinguish them from edge pounders. The wear patterns imply that these objects were used for pounding and crushing. Probable uses for the tools include stone knapping, crushing minerals or ceramic temper, and the shaping of ground stone artifacts. Two hammerstones, one of C2 chert and one of petrified wood, were found in Pithouse 1. One came from the fill and the other was in the fill 10 cm. above the floor.

Edge Pounders. Edge Pounders are similar to hammerstones in that they are small, hand-held cobbles or cores, which exhibit battering on natural and manufactured edges. The more restricted use areas of the tools would have allowed for more concentrated and precise striking points. Such tools probably served functions similar to those suggested for hammerstones.

Eighteen quartzite edge pounders were identified (Pl. 12 l, m). All but one were broken cobble fragments, a few originally served as manos or abrading stones. The remaining specimen was a core. In addition, a few of the edge pounders were also used as edge grinders. All but three were found in fill contexts and one each of the final two came from the floor of Pithouse I and the Work Room floor.

Abrading Stones. Abrading stones are artifacts made of abrasive stone which have been worn due to their use on a variety of materials. They have been used for shaping wood or bone, or for

smoothing stone objects such as axes, mauls, metates, manos, or even building stone. Seventeen abrading stones were found, including one which was also used as a hammerstone and two that had also served as edge grinders.

Ten of the abrading stones are sandstone, five are quartzite and two are limestone. Fourteen were recovered from fill contexts, one lacked provenience, while one was found on the floor of Pithouse 1 and another on the surface around Exterior Hearth 2. They are evenly divided between bifacial and unifacial types with seven of each. Two are cylindrical objects which show more than two use facets. Most of these tools were simply unmodified stones with only three exhibiting modification through pecking and abrading. These are small, hand-held tools ranging from 2.6 to 15.9 cm. long by 1.6 to 11.09 cm. wide and from 3.9 to 6.2 cm. thick. One of the sandstone specimens exhibits two small grooves on the upper surface, which may have served to sharpen needle or awl tips. One of the limestone specimens is a conchoidal-shaped stone, which may have been used as a smoothing stone.

Polishing Stones. Polishing stones are defined by Woodbury (1954:96-97) as those artifacts which are generally water-worn stones with one or more nearly flat use surfaces which exhibit fine striations or are highly polished. The stones are generally unmodified and the use portions appear to be perpendicular to the use surface. They are usually made of quartzite and they may have been used to smooth ceramic vessels and clay floors, or to grind and crush soft materials such as pigments. Four complete polishing stones and two fragments were found during the course of excavations.

The complete polishing stones are quartzite cobbles, two of which show bifacial use and two have been used unifacially. None have been modified and they range from 3.4 to 11.7 cm. long by 28.0 to 9.0 cm. wide and from 1.7 to 6.1 cm. thick. One of the fragments shows unifacial use, while the other has been used bifacially. Both fragments are quartzite and, like all of these artifacts, they were recovered from fill contexts.

Edge Grinders. Edge grinders are cobbles or cobble fragments small enough to be held in the hand and which exhibit a distinctly flattened edge created by grinding (Pl. 14 a, b). The nature of the ground edge implies that these tools were used on flat abrasive surfaces, probably grinding platforms. These artifacts could have been used for processing seeds, pigments, or pottery temper.

Thirteen edge grinders were recovered from the site, including one which had also been used as a scraper. Twelve are quartzite and one is a limestone/quartzite conglomerate. All are unmodified in terms of their use as edge grinders, but five were mano or abrading stone fragments and two had originally been used as hammerstones. Twelve were found in fill or midden contexts and one came from the floor of Pithouse 1.

Hatch Cover. Hatch cover is a term used to designate circular to rectangular pieces of shaped tabular stone used as covers for storage cists, room or pithouse entrance covers, and for ventilator shaft covers. Two of the hatch covers found at Dead Raven were nearly complete, being made of limestone. Both came from the fill of Pithouse 1. One is nearly square, measuring 30.8 cm. by

27.5 cm. and it is 2 cm. thick. Portions of the edge have been roughly bifacially flaked and one surface is ground fairly smooth. The other, also complete, is irregularly shaped and its edges have been roughly flaked or ground. It measures 17.4 cm. by 14.0 cm. and 1 cm. thick with one surface smoothly ground.

The remaining four examples of hatch covers are fragmentary but all were identified by remnants of intact edges. Three are limestone and all were found on the floor of Pithouse 1. All exhibit rough bifacial flaking and grinding along the edge and they range from 9 to 13 mm thick. The remaining fragment is an irregularly shaped piece of tabular sandstone. One edge has been roughly flaked on one side but both surfaces appear to have been ground. The piece measures 32 cm. long by 18 cm. wide (incomplete), and it is from 1.6 to 3.2 cm. thick.

Disks. Disks are circular pieces of stone which, in this case, exhibit unifacial or bifacial flaking around the edges and one surface has usually been more smoothly abraded than the other (Pl. 14 C-e). Six disks were found, five complete and one fragmentary. The function of the disks has not been determined, but some have a shallow groove around the edges as though to make them easier to grasp. The complete disks range from 3.8 to 5.9 cm. in diameter and they vary from 3 to 9 mm thick. One complete disk was made of sandstone while others are limestone. All were recovered from fill contexts.

Spheres. Spheres are sandstone ball-shaped objects that have been pecked and otherwise abraded (Pl. 14 f-h). Three were found, two in Pithouse 1 fill and one from the roof fall of Pithouse 2, and two of the three showed flat spots on surfaces. Woodbury (1954:171-173) says the balls were used as gaming objects, as an element of a weapon, and to create the sound of thunder by rolling them over resonators in kivas. The recovered spheres range from 5.03 to 5.72 cm. in diameter.

Modified Stone. The modified stone category includes a group of items which have been modified by abrading or flaking to form certain shapes for unknown uses. Eight were found during the project. Three were triangular with one made of limestone and two of sandstone. A soft piece of limestone is cylindrical in shape. A sandstone object is irregularly ground. All of the stones have been shaped by abrasion and are quite small. The remaining three are fragments showing rough flaking on the remaining edges. Two were formed of limestone and one of sandstone. All three could be core fragments.

Miscellaneous. A miscellaneous group includes three items. One is an unfinished pipe while the others are a complete and a fragmentary pendant. The pipe is a tapering cylindrical piece of reddish stone which has been ground smooth (Pl. 14 j). The exterior surface exhibits seven facets, some of which are quite flat. Holes have been drilled in each end but they do not meet. At the larger end the hole is well centered and tapering, being 1.2 mm in diameter and 2 cm. deep. The interior surfaces of the hole are smooth and reveal circular striations that apparently result from the rotary action of the drill. The pipe, found in Pithouse 1 fill, measures 4.32 cm. long and varies in width from 1.3 to 2.4 cm.

The complete pendant is circular with a biconically drilled hole near one edge (Pl. 14 i). The edge just above the hole also shows traces of a previously drilled hole, suggesting that the

pendant was once larger. The surfaces are flat to slightly convex and they have been smoothly ground, while the edge ranges from flat to round. Striations from shaping are visible on both surfaces around the edge. The pendant is made of a soft material, possible shale, which is dull red in color and which has an average diameter of 12.35 cm. while it is 4 mm thick. The hole varies from 2 to 4.5 mm in diameter. The pendant was found in the collapsed roof fall near the floor of Cist 2.

The final artifact is a turquoise pendant fragment found in the fill of Exterior Hearth 1. It has been heavily scarred and it is difficult to distinguish the broken edges from the intact margins. There is evidence of a biconically drilled hole along one broken edge while the intact edges seem to have been ground flat. The fragment measures 9.1 mm long with the same width while it is 3 mm thick. The hole varies from 1 to 3 mm in diameter.

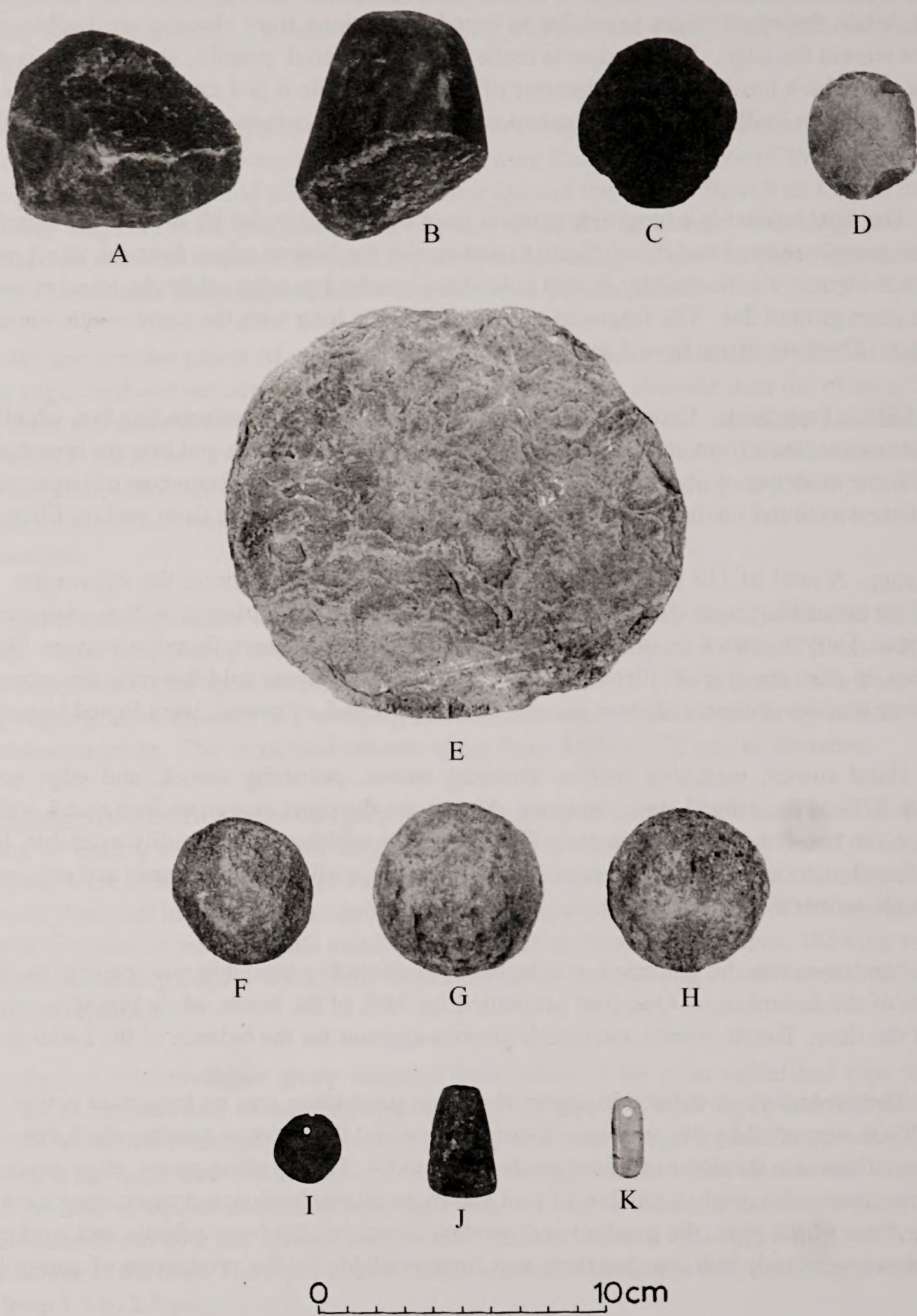
Ground Stone Fragments. Ground stone fragments are items that show grinding but, which are so fragmentary that their form cannot be determined. Nine are sandstone and two are limestone. All exhibit some evidence of abrasion and some, at least, may once have been part of larger grinding tools. One was found on the floor of Pithouse 1, while the others came from various fill areas.

Discussion. A total of 118 pieces of ground stone was recovered during the excavation. Some 25% of the assemblage was classified as grinding and processing platforms with most pieces being sandstone. Only a few of the platforms were complete and all were found in various fill areas. This may, in part, result from illegal collecting. A local informant told the crew that at one time there were metates scattered all over the site. Pithouse 1 had, of course, been looted by vandals.

Hand stones, including manos, abrading stones, polishing stones, and edge grinders, make up 47% of the ground stone category. Manos are the most numerous forms and, within the category, the two-hand type dominates. The large river cobbles, being readily available, became the preferred material type. Sandstone was also abundant, while abrading stones and edge grinders were made primarily from quartzite.

Sandstone was the preferred-or at least the most readily available-raw material accounting for 54% of the assemblage. Quartzite accounted for 24% of the items, while limestone was used 29% of the time. Basalt, diorite and conglomerates account for the balance of the collection.

The ground stone collection argues that food processing was an important activity at the site. This is supported by the presence of storage cists and the flotation results which demonstrate that horticulture was the dominant food producing activity. The abrading stones, edge grinders, and polishing stones also imply a number of tool and material production and maintenance activities. The presence of the pipe, the pendant and pendant fragment, the bone whistle and worked shell (see below) seemingly indicate that there was time available for the production of non-utilitarian items.



Pl. 14. A-B, Edge grinders; D-E, Disks; F-H, Spheres; I, Pendant; J, Stone pipe; K, Bone pendant.

Bone and Antler

A total of 624 pieces of modified and unmodified bone was recovered during the Dead Raven excavation. In the first category, 60 were identified as modified, used or cut bone. All bones were analyzed with the aid of the osteological collection at the Archeology Center at the University of Utah. The specimens were then typed according to species, genus, family or order. When more specific identification was not possible, the bones were simply classified as coming from large or small mammals, or as unidentified bone fragments. The artifacts or culturally manipulated bones were classified in terms of morphology, evidence of use or modification and traditional typologies. They were also examined under a 15x binocular microscope for evidence of use. The evidence usually took the form of wear polish and/or striations. The modified bone categories included awls, fleshers, needles, a whistle, a spatulate tool, a pendant, a gaming piece, a miscellaneous category, bones which have been used, polished, cut, and those exhibiting modification in preparation for splitting.

Awls. Eleven bone awls were recovered and divided into two types, A and B. There were eight complete Type A awls and one broken tip of the same category (Pl. 15 a-e). All were made of metapodial bones, seven from mule deer (*Odocoileus hemionus*) and two simply identified as *Artiodactyla* sp. Type A awls were made of longitudinally split metapodials with the distal end intact on seven and the proximal end on one. The entire split bone has been ground, particularly the head, in order to flatten the surfaces and the interior surface of the bone. The lateral edges and the surfaces of the bone tended to be highly polished and they have also been flattened by deliberate modification. The bone shafts taper down to blunt, wedge-shaped and rounded or faceted tips which have been polished in all cases. Tips also exhibit crosswise or diagonal striations from use, and occasionally small flakes have been removed from the tip. There are frequently crosscut marks on the lateral edges just below the articulated end, which may have something to do with the initial bone-splitting process. Lastly, one of the awls had red ocher smeared on the upper surface. The awls range from 9.1 to 21.8 cm. long.

Three of the Type A awls were found in Pithouse 1 fill, two were from the Work Room fill, one was found on the Work Room floor, and three lay side by side on the floor of Cist 2.

The two Type B awls are composed of large mammal long-bone splinters which have been shaped, ground and polished (Pl. 15 f,g). On each artifact one end tapers down to a sharpened tip while the other end has been modified to shape. One distal end is cut on a slight angle and one is wedge shaped. Both appear to have been used. The tips are faceted and both have been broken and subsequently reused. Both of the awls were recovered from the fill of Pithouse 1 and are 11.6 and 15.8 cm. long.

Fleshers. Nine bone tools of this type were distinguished in the collection and were subsequently divided into Types C, D, and E. Five fall into the Type C designation, of which four are composed of longitudinally split mule deer (*Odocoileus hemionus*) metapodials and one is a split *Artiodactyla* metapodial, and all have intact distal ends (Pl. 15 h,i). All of these tools have been ground smooth and polished, and then use-end tapered. The upper intact bone surface is rounded, while the split

surface is flat, including the distal end. Two of the tools exhibit tips diagonal in overview and wedge shaped in profile. The leading edges are well polished from use and small flakes have been removed from one of them. The other three appear to have originally been awls but the tips have broken off and the remaining edge has been used. The resultant edges are generally rounded and highly polished, while one has had small flakes removed by use and is wedge shaped in profile. These artifacts vary from 9 to 14.2 cm. long. Two were recovered from the fill of Pithouse 1, one from the roof fall of Pithouse 2, one from the Work Room floor, and one from Cist E within the Work Room.

Two Type D fleshers were recovered from the fill of Pithouse 1. Both are composed of split large mammal long bones lacking an articulated end. One has a spatulate, convex working edge which is rounded in profile and highly polished, but with a few flakes removed by use (Pl. 15 j). Striations on the used edge run at right angles to the length of the tool, while the entire artifact has been ground and polished. It measures 11.7 cm. long. The other artifact of this type exhibits a polished tip which is rounded in profile, while the other end is wider. It has been highly polished and flakes were removed along the use edge. The entire artifact has been ground smooth and polished.

The remaining two Type E fleshers were made of mule deer split metapodials with the distal end intact (Pl. 15 k, l). The working ends are spatulate with a convex shape, while the edges are rounded wedges in profile, which has become polished through use. Flakes have been removed along the working edge of one of the artifacts. Both of the tools have been ground to shape and polished from use, especially on the flattened interior bone surface. The pieces measure 9.1 and 9.7 cm. long. One was recovered from the fill of the ventilator shaft of Pithouse 2, while the other was found on the floor of Pithouse 1.

Pins. Two objects identified as 'pins' were recovered from the fill of Pithouse 1 (Pl. 15 m,n). Both were made of thin bone splinters that have been finely shaped. One of these has a tapering, rounded tip which is highly polished, while the shaft is composed of four to five flat facets. The other end is composed largely of two flat, tapered surfaces which form a wedge. One edge is highly polished. The first needle measures 7.45 cm. long by an average 3.2 mm wide and 3 mm thick. The other item of this type is similar to the first specimen although it is somewhat flatter. One end roundly tapers to a blunt and highly polished point. Small flakes were removed from this end. The other end flatly tapers, and striations running perpendicular to the edge are evident while the blunt tip exhibits light diagonal striations. It measures 6.9 cm. long by an average 6 mm wide and 2 mm thick.

Spatulate Tool. This artifact is complete and made of a mule deer left metatarsal, which has been split in half, leaving the distal end intact (Pl. 15 p). The bone is slightly weathered but the entire surface is smooth. The modified end is spatulate and along the lower 4 cm. the laterals have been flattened rather than rounded. The end of the bone is rounded, apparently from modification rather than from use. Below the intact distal end the outer bone surface is marked with a number of small incised lines running at right angles to the longitudinal axis of the tool. Towards the spatulate end these lines are quite distinct while moving up the shaft they become more indistinct and are clustered together. The function of the tool is unknown. It measures 25.6 cm. long by an average

If 1.7 cm. wide and 7 mm thick, while the incised lines vary from 7.8 to 18.2 mm long and from 1 to less than 1 mm wide. It was recovered from the roof fall of Pithouse 1 ca. 10 cm. above the floor.

Whistle. A complete bone whistle was recovered from the fill of Pithouse 1 (Pl. 15 o). It is made of a slightly asymmetrical hollow bone, the exterior of which is highly polished though somewhat faceted. The ends taper slightly with one tapering more than the other. This suggests that this was the mouth piece, while the end edges are slightly rounded and apparently ground smooth. A slightly oval hole or stop has been drilled into the bone and the edges have been ground smooth and exhibit a high polish. When blown, the whistle produces a shrill sound which does not seem to carry very far. It measures 9.8 cm. long with a diameter ranging from 9 to 10.2 mm. The stop measures from 7 to 8.5 mm in diameter at the top and from 3.8 to 5 mm in diameter where it opens up at the interior. The end openings range from 5 to 7 mm in diameter.

Unidentified Tool. A broken mule deer left metatarsal with the distal end intact was found in the roof fall of Pithouse 2. It appears that this bone was going to be split longitudinally to form an implement similar to Type A awls and fleshers before the proximal portion broke off. The break formed a pointed protrusion exhibiting a blunt and rounded smooth tip which appears to have been used. Small flakes have been removed from the rounded intact lateral edge, while most of the other lateral has split off. The bone surface near the utilized tip has become smooth and polished, apparently from use on soft materials. The tool measures 10.3 cm. long and 1.9 to 15.8 mm wide.

Tool Shafts. Two broken tool shafts were recovered during excavation. One, made of a split mountain sheep (*Ovis canadensis*) metatarsal, was broken during excavation. It was recovered from the fill of Cist D within the Work Room. The remaining portion may have been the shaft of a Type A awl or flesher. The intact portion has been ground smooth and polished. It measures 6.2 cm. long by 1.38 cm. wide and 6.8 mm thick. The other artifact of this type was broken prehistorically and it was heavily burned. It is composed of a split mule deer metapodial with the distal end intact; it was recovered from the use surface associated with exterior Hearth 2. The whole bone has been ground smooth and both surfaces are polished. In addition, the interior surface of the split condyle has been ground flat and polished similar to the fleshers described above. It measures 8.6 cm. long and the shaft averages 1.4 cm. wide by 8.6 mm thick.

Antler Tools. Two tools made of Artiodactyla antler were found in the fill of Pithouse 1. The first is an antler-tine handle with a small, shaped nodule of Type C chert embedded in the hollow base (Pl. 15 q). The stone has been battered or pounded and pecked on the protruding side so that it has become slightly rounded. The antler handle is slightly curved and the surface has begun to deteriorate but the tip of the tine is intact. The entire object measures 9.7 cm. long with the stone protruding some 1.4 cm. from the handle. The tool appears to have been used for crushing or pounding materials on a hard surface.

The second specimen is a short, curved antler tine which has been utilized on the intact tip (Pl. 15 r). The utilization has blunted and smoothed the tip, which is wedge shaped in profile. One surface is flattened and it has light diagonal to crosswise striations suggesting some use in a rotary

motion. The remainder of the antler is unmodified but it does exhibit a few incised lines and/or cut marks along its length. It measures 11.7 cm. long and an average 1.45 cm. in diameter, narrowing to 8 mm at the tip.

Pendant. This is a small, modified piece of bone which was recovered from the floor of Pithouse 1. It is an ovoid rectangle with flat lateral edges which form a slight apex at the drilled end. The hole was drilled from the interior surface and the entire piece has been highly polished. In all it measures 28.4 mm long by 11.8 mm wide and from 2.7 to 3 mm thick, while the drilled hole averages 2.9 mm in diameter on the lower 6.5 mm of the bone.

Gaming Piece. A small, ovoid piece of modified split bone was recovered from the floor of Pithouse 1. The upper surface was smooth and polished although it was beginning to deteriorate. The bone is grayish white in color, possibly burned or having been set in ash. The edges have been ground flat while the ends are slightly rounded. The interior surface has been etched with heavy and light lines which run lengthwise, crosswise, and diagonally. It measures 16.4 mm long by 9.8 mm wide with an average thickness of 3.5 mm.

Miscellaneous. Twenty-nine pieces of bone were placed in this category, including those which have been used, modified in preparation to splitting, those exhibiting polished surfaces, and specimens exhibiting cut marks and or striations. Four have been used, including two large mammal long bone fragments which exhibit unifacial and bifacial scarring along broken edges. One was from the antechamber fill of Pithouse 2, while the other was from Pithouse 1 fill. In addition, an *Artiodactyla* split long bone fragment, also recovered from Pithouse 1 fill, exhibited unifacial scarring along one edge. Lastly, an *Artiodactyla* metatarsal fragment had been split and ground, possibly from use. It was recovered from the fill of Cist 1.

A total of nine bones exhibited some evidence of modification preparatory or subsequent to longitudinal splitting of the metapodial bones for use as tools. The most complete specimen was a mountain sheep (*Ovis canadensis*) left metatarsal and attached phalange bones found lying on the bench of Pithouse 1. The two sets of deeply incised parallel lines were etched just below the distal end and a line ran a slightly diagonal course down the length of the bone. Seven of the fragments were identified as *Artiodactyla* metapodials. Many show incised lines running lengthwise down the vascular groove and four were broken before the splitting process was completed. The final specimen is a mule deer (*Odocoileus hemionus*) metatarsal which exhibits cut marks below the distal end and a single longitudinal incised line. Five of the eight specimens were recovered from the fill of Pithouse 2, and three were found in the fill of Pithouse 1.

Five bones, including one *Artiodactyla* rib fragment, two long bone fragments, a large mammal long bone fragment, and a burned *Artiodactyla* long bone fragment, exhibit a polished surface. These surfaces range from a high gloss to a very slight sheen, while the burned fragment may have originally been part of a larger tool, particularly as it is the interior surface which is polished. These artifacts were recovered from a variety of fill contexts.

The remaining eleven bones exhibit light to heavy cut marks and/or striations on the bone surface. Six were *Artiodactyla* rib fragments, two were large mammal long bone fragments, one

of which was heavily fire blackened and one each was a scapula fragment, a small mammal long bone, and a fragment of unidentified bone. The burned bone fragment was recovered from the use surface associated with Exterior Hearth 2, while the rest were from fill contexts.

Unmodified Bone. A total of 564 pieces of unmodified bone was recovered during the Dead Raven excavation, a fairly high count for a Virgin Anasazi site. A large part of the collection, of course, represents preservation conditions which were well above average. Nearly 20% of the assemblage, 109 bones, were unidentifiable. Identified bone included 114 Artiodactyla bones, 92 large mammal bones, 88 small mammal, 80 cottontail (*Sylvilagus* sp.), 26 jackrabbit (*Lepus* sp.) bones, 8 mule deer (*Odocoileus hemionus*) bones, and 3 mountain sheep (*Ovis canadensis*) bones. The remaining bones consisted of two unidentified mammal bones and one each of *Cynomys* sp., *Nestoma* sp., *Sciurus* sp., and a Rodentia bone. Only 29% of the unmodified bones were burned but a larger number appear to have been split, suggesting use as a food resource. In addition, although mule deer and Artiodactyla species are native to the area, the amount of bone of this type implies that hunting was an important activity for residents of the site. The amount of cottontail rabbit and jackrabbit bone, representing at least 12 individuals and 3 individuals, respectively, suggest that they may also have provided meat for the site's inhabitants, although it is also probable that many of these bones may have been introduced by natural means.

The vast majority of the identified bone (87%) was recovered in fill contexts, although some came from the floor of Pithouse 1, and the fill of one of the clay-capped basins and the overlying 10 cm. of fill within the structure. In addition, the use surface associated with Exterior Hearth 2 also produced a number of bone fragments.

Discussion. The total bone count, both modified and unmodified, represents only a limited number of individuals including 12 cottontails, 9 mule deer, 3 jackrabbits, and one mountain sheep. This is a small number of single animals but the remainder of the bone, particularly the 22% Artiodactyla bone suggests that hunting was fairly important for the site's residents. In addition, only part of this site was sampled and much more bone is probably preserved in untested areas.

Mule deer appears to have been the preferred hunting resource both for its meat and the bone it provided for tools. The hind and fore quarters seem to have been brought to the site for processing and the metapodials seem to have been a preferred tool raw material. The deer would probably have been available on the canyon floor and immediately adjacent uplands, making them a fairly predictable resource. Some 31% of the bone tools were made from mule deer bone and 34% were classified as Artiodactyla, while in terms of the total faunal assemblage 4.5% were mule deer and 22% were Artiodactyla.

A preference for Artiodactyla metapodial as a material for tools can be traced to the Basketmaker period in this area as awls similar to those ascribed to Type A in this report were found at Cave Dupont. Further at a Basketmaker III site (42Ka2147) located south of the Dead Raven site (Douglas McFadden, personal communication). Similar awls were recovered from Bonanza Dune (Aikens 1965). Also recovered from the Dead Rave site were a number of Artiodactyla metapodials and fragments which were found in several stages of modification in preparation for longitudinal splitting. These modifications included the incision of small crosswise marks below

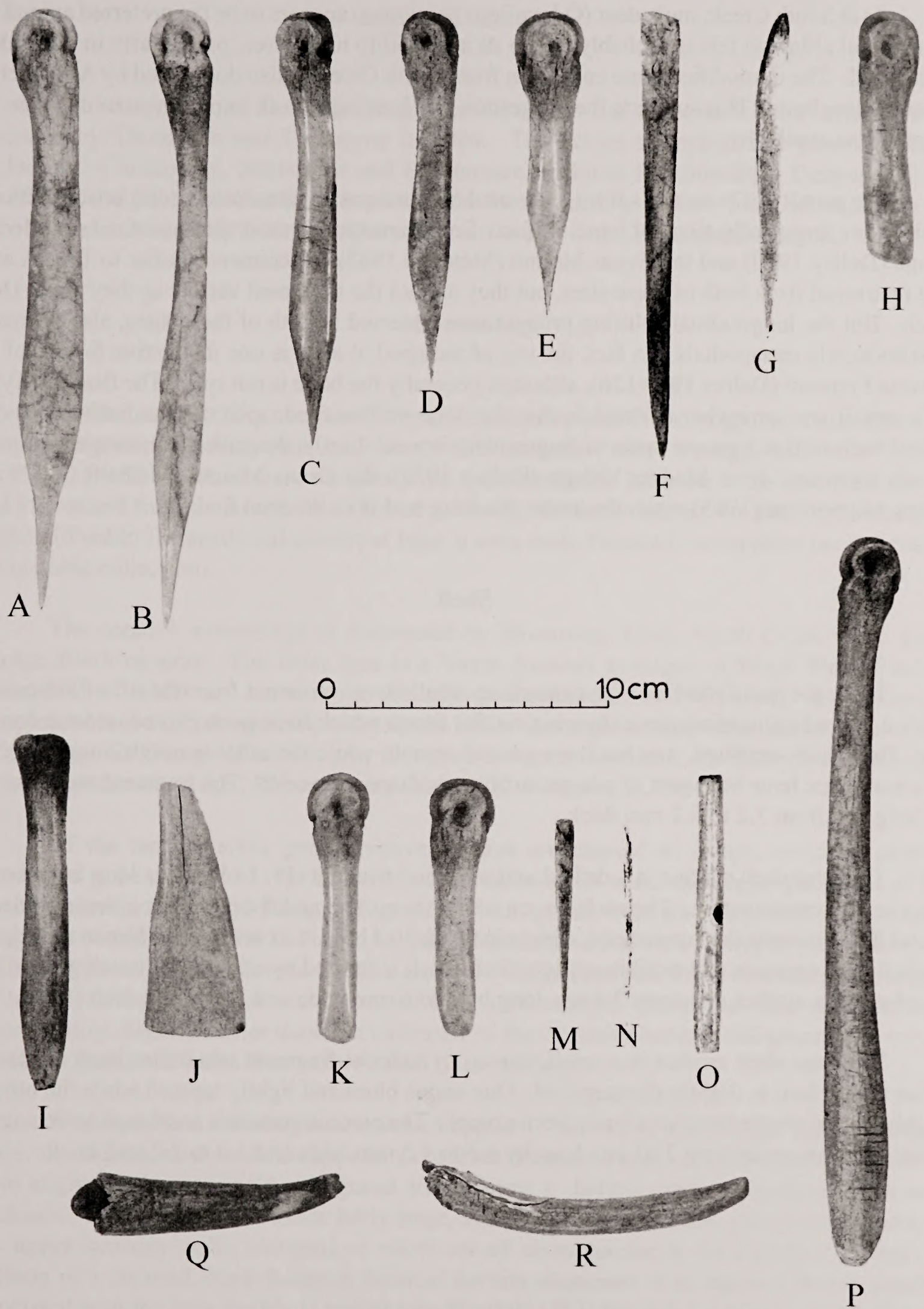
the proximal or distal ends. The marks occur singly, in pairs, or as a series and they appear to have been formed by a sharp flake or knife. The exact function of the marks is not evident but they appear too regularly in specific locations to represent butchering marks. In contrast, the other marks run longitudinally down the vascular grooves and, although they may have begun as a cut mark, subsequent work appears to have been done by friction or abrasion. The resultant marks are smooth and generally roundly concave in cross section. These modifications are obviously related to the physical splitting of these metapodials for further refinement into a variety of bone tools.

This process was also observed at Median Village (Dalley 1970:97) and at Evans Mound (Metcalf 1982). Both are Parowan Fremont sites in central Iron County some 75 miles northwest of the Dead Raven site although the longitudinal groove appears to have been formed by cutting rather than abrasion. These split bones were apparently used for making awls but not dominantly as at this site.

A fairly high concentration of bone, including 58% unmodified and 42% modified was recovered from Pithouse 1; this amounted to 56% of all bone found during the excavation. Only 14% of the pithouse collection was found on the floor, the bench, or the lower 10 cm. of the fill. Since the structure was partially burned when it collapsed, it seems that it was in use at the time of destruction. The number of bone tools found within it seems to support this supposition. In addition, the number of bone tools found near the floor and in the fill suggests that they were kept or stored in the interior of the roof support elements.

Another interesting find involved three Type A bone awls found lying side by side just above the floor of Cist 2. Also from this cist were 11 Type C utilized flakes, a pendant, azurite fragments, and four sherds of Moapa Red Ware suggesting that this structure was a specialized storage feature.

As previously mentioned, the Dead Raven site contains an unusually high number of bone tools. Apparently the number indicates that when bone was readily available, these tools were a frequent component of the tool kit. Awls identical to those called Type A in this report were recovered at the excavations in Johnson Canyon at 42Ka2147 by Dalley and McFadden (Douglas McFadden, personal communication) and at Bonanza Dune by Aikens (1965). Aikens also found bone tubes which may have been unfinished whistles similar to the one found at Dead Raven. Six of the worked bone tubes were found at Bonanza Dune (Aikens 1965:123) which is also located in Johnson Canyon. A bone whistle somewhat similar to the one recovered in this project was found at ZNP-21, a cave site intermittently occupied from Basketmaker II time in Parunuweep Canyon (Schroeder 1955). Only a few other bone artifacts were recovered from the excavations in the Zion Park area (Schroeder 1955) including three awls, two punches, a bead, a tube, and a flesher or scraper. Excavations at the Quail Creek sites yielded only three awls, a mountain sheep scapular sickle, a rib exhibiting cut marks and two utilized bone fragments (Walling et al. 1986:434-435). Lastly, the South Creek site (Walling and Thompson 1986) located just southwest of Zion Park, yielded six bone tools, an antler tool, and 67 pieces of unmodified bone. The tools included four awls, one made from a mule deer ulna, a serrated mule deer ulna artifact, a mule deer Scapula tool and an antler-tine flaker.



Pl. 15. A-E, Awls Type A; F-G, Awls Type B; H-J, Fleshers Type C; J, Flesher Type D; K-L, Fleshers Type E; M-N, Bone pins; O, Whistle; P, Spatulate tool; Q-R, Antler tools.

As at South Creek, mule deer (*Odocoileus hemionus*) appears to be the preferred animal for raw material although this is probably due to its availability in the area, particularly in the middle and late fall. The unmodified bone collection from South Creek is also dominated by Artiodactyla and mule deer bone. This supports the suggestion that hunting was an important activity when the resource was available.

The paucity of bone tools from excavated Virgin Anasazi sites makes comparison difficult, but there are large collections of bone artifacts from Parowan Fremont sites, particularly Median Village (Dalley 1970) and the Evans Mound (Metcalf 1982). Specimens similar to Type A awls were recovered from both of these sites, but they are not the dominant variety as they are at Dead Raven. But the longitudinal splitting process was observed at both of these sites, also primarily on Artiodactyla metapodials. In fact, the use of metapodial awls is one distinctive feature of the Parowan Fremont (Dalley 1970:126), although generally the bone is not split. The fleshers, Types C, D, and E are somewhat unusual in that they are well-worked, split metapodial tools and in general tools of this type are made of fragmentary bones. Lastly, the antler-tine scraper is similar to tools recovered from Median Village (Dalley 1970), the Evans Mound (Metcalf 1982) and Aikens excavations (1965) while the antler crushing tool is an unusual find.

Shell

Three pieces of modified *Glycymeris* sp. shell were recovered from the fill of Pithouse 1. One is a curved cylindrical piece showing six flat facets which have been carved into the convex edge. Both ends are blunt, one has been ground smooth while the other is rough, suggesting the piece may once have been part of a larger artifact, perhaps a bracelet. The fragment measures 4.1 cm. long and from 3.2 to 5.3 mm thick.

The next shell artifact is a drilled and modified pendant (Pl. 14 k). It is long and narrow, with a square cross section. The surfaces are smoothly ground and the edges are either rounded or ground flat. Towards the tapered end, a biconically drilled hole is located quite close to the edge of the shell. The opposite end exhibits a slight foot which is formed by an rounded notch ground into one edge. The artifact measures 2.5 cm. long by 4 to 6 mm wide and 2 to 4 mm thick.

The final shell artifact is a small, curved cylindrical fragment which has been weathered so that the surface is slightly decomposed. One end is blunt and lightly tapered while the other is roughly jagged where there has clearly been a break. The piece is quite thin and roughly rectangular in cross section, measuring 2.03 cm. long by 4.1 to 4.5 mm wide and 1.9 to 2.2 mm thick.

SUMMARY AND CONCLUSIONS

The excavation of Dead Raven proceeded within the framework of a research design prepared by Thompson and Thompson in 1984. The design addressed five general domains, including: Chronology, Settlement and Subsistence, Cultural Relationships, Demography, and Technical and Material Culture. Separate and interrelated questions were addressed in each general research category both during the excavation and in the subsequent analysis.

Chronology

As discussed in the section on Cultural Relationship and Chronology, two of the three C-14 samples submitted for assay produced dates within the early Pueblo II range, A. D. 830 +/- 70 and A. D. 940 +/- 60. Both of these samples were recovered from Pithouse 1, the first from the floor and the second from the hearth fill. Viewed narrowly, the dates suggest the site might represent a Pueblo I/Pueblo II transitional site or, at least, a very early Pueblo II occupation (as indicated by the ceramic collection).

The ceramic assemblage is dominated by Shinarump Plain, North Creek Gray, and St. George Black-on-gray. The latter type is a Virgin Anasazi analogue of Black Mesa Black-on-white, both of which are markers for the early and middle Pueblo II period. In addition, the complete absence of corrugated pottery in the collection argues for an occupation prior to A. D. 1050. Since St. George Black-on-gray is known to appear around A. D. 900, the ceramics place the occupation within the 150 year period from A. D. 900 to A. D. 1050.

Of the ten projectile points recovered, five are classed as Abajo, which is generally considered to be a Pueblo I type in the Mesa Verde area. In addition, single specimens of Rose Spring Corner-notched and Eastgate Expanding Stem points were also identified. The former is thought to be a Basketmaker II-Pueblo I type and the latter a Pueblo I variety in the eastern Great Basin and the adjacent Colorado Plateau areas. A single Parowan Basal-notched point suggests a Pueblo II occupation but it was recovered from a fill context. The points recovered do suggest an occupation slightly earlier than that indicated by the ceramics but it is still possible to say they indicate a Pueblo I/Pueblo II or early Pueblo II occupation.

When confined to those features which appear to have been a part of the major occupation phase, the architectural evidence appears to confirm the early Pueblo II inhabitation. The storage room alignment is apparently contiguous and it forms a shallow crescent opening to the south-southeast. The cists themselves are fairly large, ovoid, semi-subterranean, slab-lined features with low upper masonry walls, elements of which are all characteristic of the Pueblo II period. The addition of a covered Work Room in front of the cist alignment is an unusual feature generally associated with the later Pueblo II period (see Westfall 1987) but it is not inconceivable that such a structure might occur earlier in the record.

Pithouse 1 is southeast of the cist alignment in the expected location for Pueblo I. The room is benched, a characteristic of Basketmaker III, Pueblo I and early Pueblo II periods. The semi-subterranean nature of the structure, the interior slab lining and clay-capped, sand-filled basins are all features found in Pueblo I and Pueblo II pithouses.

The chronological placement of the main occupation of the site is slightly ambiguous. The architectural features, the projectile point collection and two of the carbon dates all suggest that the occupation was during the Pueblo I/Pueblo II transition period. The ceramic evidence, the primary relative dating method common in the Southwest, indicates an early Pueblo II occupation between A.D. 900 and A. D. 1050. An assessment of all the evidence argues for a very early Pueblo II occupation occurring just after A. D. 900.

Pithouse 2 is apparently associated with a separate occupation/site located to the north. Its presence suggests that the associated use occurred just before or slightly after the occupation associated with Pithouse 1 and the storage cist alignment. The architectural features of Pithouse 2 are similar to those of Pithouse 1 and it shares the same surface or origin. Still further, Exterior Hearths 2 and 3 are also later manifestation of site occupations since both originate within Stratum 2 while the lack of corrugated ceramics continues to argue they were used prior to A. D. 1050.

Settlement and Subsistence

It has been suggested that the Virgin Anasazi relied on horticulture as their principle food source, but that they continued to supplement their diet by foraging for wild foods. The favorable environmental location, the presence of storage structures, and the dominance of domesticated corn and beans in the flotation samples all argue for a strong reliance on plant domesticates at Dead Raven. Only a small percentage of the flotation samples produced remains of wild plants (see Appendix A).

Pollen and flotation data recovered from sites in the general area, including the Kanab site (Nickens and Kvamme 1981), the Pinenut site (Westfall 1987), and sites tested along the Vermilion Cliffs east of Johnson Canyon (Westfall 1985), seem to indicate a more mixed economy including a reliance on both domesticates and wild plant resources. These sites span a range from Pueblo I to late Pueblo II. Evidence from Quail Creek sites (Heath In: Walling, et al. 1986) suggests that the Virgin Anasazi in the Hot Desert environment became dependant on a more restricted plant resource base during Pueblo II, although the majority of the data was recovered from sites occupied after A. D. 1050.

Specifically, the presence of beans and the contention that they were grown at Dead Raven presupposes a permanent occupation. Beans, unlike corn, are a labor intensive crop requiring maintenance from planting until harvest time. Thus some of the sites occupants would have been required to stay at the site throughout the growing season.

Another subsistence question addressed at Dead Raven concerned the consumption of animal protein. Although the minimum individual count is fairly low, consisting of 12 cottontails, 9 mule deer, 3 jackrabbits, and 1 mountain sheep, in all there are 624 pieces of modified and unmodified bone in the collection and Artiodactyla specimens account for 22% of the total. Mule deer would have been available in the canyon and adjacent uplands during much of each year. During the prehistoric past mountain sheep and elk were found to the north of the site and were probably available as an added protein resource.

Small camps located in the Alton Amphitheater to the north suggest that hunting and gathering activities were common prehistorically. In addition, the recovery of ten projectile points implies some hunting by the occupants at Dead Raven but they offer no clue as to its importance. Small game would have been a fairly abundant resource in the area, but the perishability of small animal remains could account for their limited presence in the record. It is likely that small animals were caught with snares and traps which would, again, leave no evidence in an open archeological site.

Finally, large mammal bone appears to have been a preferred tool material at Dead Raven. The bone tool inventory suggests that both hind and forequarters of mule deer and mountain sheep were brought back to the site. Spinal elements and rib fragments recovered during excavation and tools incorporating Artiodactyla antlers all imply, in fact, that the greater part of large mammals were brought back to the site. Also, the amount of large mammal bone and its presence in the collection suggests that the site was occupied during the fall when the majority of hunting activities were known to have occurred ethnographically.

Demography

The structural evidence found in Pithouse 1, as well as the cist alignment and its associated features may be interpreted as indicative by an occupation of an extended family group. The number of storage units and their accretional growth, along with the number of interior hearths and/or habitation structures, are assumed to point to a fair number of people living at the site over a short period of time.

Three food storage structures, Cists 1, 3, and 4, and the appended Exterior Cist were exposed during the excavation. Due to the position of the road and the limited excavation area, there is a strong possibility that the alignment continued both to the southwest and also east across the present road. In the road alone there was enough area to have allowed for at least two additional storage units. Finally, none of the excavated cists contained trash such as would have been deposited by people inhabiting the site if the cists had fallen into disuse during the occupation. It has proven impossible, then, to determine if there was an accretional growth of the cist alignment. Cists 1, 2, and 3 and their associated features appear to have been built as an integral unit, although it has been suggested that Cist 4 was a later addition to the alignment, due to its structural elements and stratigraphic position.

Two interior hearths, one in the Work Room and one in Pithouse 1, were associated with the main occupation, as was Exterior Hearth 1. The artifacts and small features within the Work Room imply that this was a primary activity area, probably used during the fall and winter months. It does not appear to have been a habitation unit, although this latter function cannot be entirely ruled out due to the incomplete remains of the structure. The presence of lithic debris and tools on the floors and in the lower fill levels of the Work Room and Pithouse 1, along with the discovery of micro-refuse in flotation samples from the structures implies that a variety of domestic and tool manufacturing activities were taking place in both locations. This may support the hypothesis that the site hosted an extended family group.

Pithouse 2 appears to represent an entirely separate occupation than that related to the cist alignment and Pithouse 1. It appears to have been associated with another roomblock located to the northwest. It does, however, appear to have been built at about the same time as Pithouse 1, given its architectural and stratigraphic similarities. Pithouse 2 appears to have been partially burned, but only after abandonment, as evidenced by the lack of artifacts in floor contact.

Exterior Hearths 2 and 3 represent continued use of the site, as they appear to be stratigraphically later than the initial cist alignment and Pithouse 1 occupation. The lack of corrugated ceramics in association with these features implies that this use occurred prior to AD 1050.

Cultural Relationships

The research design for the Dead Raven site predicted that it would be occupied by people with Virgin Anasazi affiliations. In general, the ceramic, lithic, and architectural evidence support this contention. The research design also stipulated that any contact with other traditions would most likely be in the form of intrusive ceramics and trade items, such as turquoise or marine shell, and that such contact would be minimal.

Ceramic intrusives included small counts of Kayenta and Moapa wares which totaled less than 1.5% of the ceramic collection. Tusayan White Ware was the most abundant of the intrusives. As anticipated, there was no evidence of Fremont contact, except, perhaps for the single Parowan Basal-notched point. This point type is characteristic of the Parowan Fremont but it is moderately common in Virgin Anasazi sites in Washington County, which is probably the most likely area of contact for this particular artifact. The numbers of bone tools and bone scrap collected at Dead Raven are very reminiscent of collections recovered from Parowan Fremont sites in central Iron County, but large numbers of bone tools have been found in other sites in Johnson Canyon (Aikens 1965; McFadden personal communication). The awls, in particular, are morphologically and typologically similar to those recovered from other sites in Johnson Canyon, but not to those from Fremont sites (see bone section). This suggests the development of an indigenous bone tool technology, at least in this area of the Virgin Anasazi tradition.

Only one piece of turquoise and three *Glycymeris* sp. shell fragments were found. All of the items had been worked to some degree, suggesting that they arrived in the area through some

sort of low-level trading, and not direct contact with the procuring populations. Thus, although trading occurred in the area, it was not conducted to the degree observed in the neighboring Kayenta and Mesa Verde traditions.

Technical and Material Culture

As hypothesized, both the artifactual material and the structural evidence accumulated during excavation conforms in most respects with comparable data recovered at other Virgin Anasazi sites of similar temporal position. The ceramics are dominated by the locally produced Shinarump series, North Creek Gray and St. George Black-on-gray, the latter diagnostic of early and middle Pueblo II times.

The projectile point typology is somewhat inconclusive since the collection includes Abajo, Rose Spring, Eastgate, and Parowan Basal Notched points. The latter three types are all commonly found on sites to the west in Washington County. The bone tools appear to represent an indigenous development, perhaps in part due to the locally available large-mammal population.

The architectural evidence includes largely semi-subterranean, ovoid, slab-lined storage cists arranged in a continuous alignment. These structural elements and their configuration in an arc is a pattern well documented in Pueblo I sites further west in both Hot and Cold Desert areas (Walling, et al. 1986; Dalley and McFadden 1985; Richard Thompson personal communication). The location of the associated dwelling, Pithouse 1, to the southeast of the storage alignment is a site pattern observed in Pueblo I throughout the Virgin Anasazi region. Both Pithouse 1 and Pithouse 2 display similar structural elements placing them in Pueblo I or early Pueblo II. Diagnostic features included: their semi-subterranean form, the presence of sand-filled, clay-capped floor basins, clay walls and the slab-faced, partially enclosing benches. Pithouse 2 also exhibited a ventilator shaft entering from the southeast, a possible antechamber and a roof support system incorporated into the walls.

The only unusual architectural feature at Dead Raven was the addition of the large Work Room at the 'front' of the storage alignment. Such features are generally more common in the middle or late Pueblo II periods after A. D. 1050. In Washington County sites, they are frequently added to the end of a storage alignment.

Conclusions

The Dead Raven site is seen primarily as the year-round habitation of an extended family group living within the Virgin Anasazi cultural tradition. The inhabitants appear to have been largely dependent on plant domesticates for their diet. The clear dependence on horticulture, primarily corn and beans, is apparently the subsistence pattern for the Virgin Tradition within the Cold Desert environment. The apparent importance of animal protein in the diet is probably a

result of the site environment and local availability.

The condition of the site suggests that it was left for a period of time during early Pueblo II after which it was partially destroyed by fire. The number of tools and artifacts in lower fill and floor contact contexts of the Work Room, Cist 2 and Pithouse 1 suggests that the occupants were planning on returning to the site at some time. It is not clear whether this was seasonal abandonment, a short-term resettlement, or a hurried departure prompted by unknown forces.

Other excavated features, Pithouse 2 and Exterior Hearths 2 and 3 are thought to be the result of separate and unrelated use of the site. Pithouse 2 appears to be the habitation unit of an entirely separate early Pueblo II occupation, to the north of Dead Raven. Exterior Hearths 2 and 3 are seen to be the result of short term visits to the site which also occurred prior to A.D. 1050.

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APPENDIX A

MACROFOSSIL AND MICRO-REFUSE FROM THE DEAD RAVEN SITE

Kathleen M. Heath

This section presents the results of an interpretation of material recovered from site 42Ka2667, frequently known as the Dead Raven site. Also examined were the larger botanical remains ("field specimens") collected during the excavation of the site. Each flotation sample was processed through a flotation device and the resulting material was extracted to produce macrofossils (botanical remains) and the micro-refuse (non-botanical remains) (see Heath and Metcalfe 1984). All material was then subjected to analysis. The analysis was undertaken to provide data relevant to: 1) subsistence strategies practiced by the occupants of the site, 2) any spatial organization and activity areas within the site, 3) interrelationships between highland and lowland sites, and 4) temporal variations in subsistence strategies practiced by the inhabitants.

LITERATURE REVIEW

Although numerous sites have been excavated throughout the culture area, only two earlier projects have incorporated flotation analysis. Newman (1986) analyzed the pollen and macrofossil samples from 42Ws1712, an early Pueblo II site on South Creek in Washington County near Zion National Park. Unfortunately, the preservation was poor and only a few macrofossils were recovered. The majority of these were found in one sample which produced one Pinus shell fragment, two Gramineae seeds, four Cheno-Am seeds and 126 Onagraceae seeds. Newman concluded that it was not possible to reconstruct subsistence strategies at South Creek due to poor preservation.

Flotation analysis was also completed on 26 sites excavated during the Quail Creek Reservoir Project. Twenty-two of the sites produced macrofossils (Heath 1986), dominated by the taxa Zea mays (corn) and Chenopodium spp. (goosefoot). These sites ranged in date from Basketmaker III to the Southern Paiute occupation with the majority of macrofossils being recovered from Pueblo I occupations. Heath concluded that the prehistoric people of the Quail Creek locality practiced a mixed subsistence economy which included cultivation of domesticates and the gathering of wild plants with little change in subsistence strategies through time.

METHODOLOGY

The flotation samples in the present analysis were collected during the excavation of

defined features and identifiable strata. Each sample consisted of approximately one liter of bulk soil. All samples were taken to the archeological laboratory where, after cataloging, ten were selected for processing. These samples were recovered from the modern surface, a sterile stratum in a major trench, the general midden, an exterior hearth, the floor of Pithouse 2, the Pithouse 1 hearth, the floor of a large exterior cist, and the Work Room hearth. Seven field specimen samples containing large botanical remains were also submitted for analysis.

The flotation samples were processed at the University of Utah Archeological Center using a mechanical flotation device designed by Clements (1982). Each sample was first sifted through a 2.38 mm geological sieve. The material which failed to pass through the sieve (previously called the "dry fraction") was then placed in a 0.3 mm geological sieve and wet screened to glean larger remains and wash away fine soil. The "wet screened fraction" was emptied onto newspaper and allowed to dry. The portion of the original sample which passed through the 2.38 mm sieve was subsequently processed by using the froth flotation technique described by Jarman, Legge, and Charles (1982). The sample was poured into the flotation tube which had been partly filled with water and the mixture was agitated by a flow of air pumped into the bottom of the tube through a single nozzle. The "light fraction," consisting of buoyant material that floated to the top of the tube, was poured into a 0.3 mm sieve and then emptied onto newspaper allowed to dry. The "heavy fraction," consisting of the material which sank to the bottom of the tube, was then decanted into the sieve, pushed by an added flow of water. The heavy fraction was also placed on newspaper to dry.

The wet-screened fraction was examined under a magnifying glass, while the light and heavy fractions were studied under a binocular dissecting microscope equipped with a 6-50X variable power gauge. Macrofossils and micro-refuse were then hand-picked and placed in vials pending identification.

Macrofossils from the flotation samples and the field specimen samples were identified by consulting seed identification manuals (Albee 1980; Arnov, Albee, and Wycoff 1980; Heath 1987; Martin and Barkley 1961) and by reference to a seed collection compiled by the writer.

RESULTS

The ten flotation samples produced a total of 104 charred botanical remains, 37 unburned botanical remains, and 153 items of micro-refuse which included bone, lithics, ceramics, small mammalian scats, and shell. The seven field specimens produced an additional 65 botanical remains so that the total material recovered included 226 botanical specimens and 153 items of micro-refuse.

The botanical material included seeds, corn cob fragments, pine cone fragments, Juniperus spp. bud scales, and Artemisia leaves. The finds represent eight families and nine genera. Due to the morphological condition of the specimens, identification to the level of species was not always possible. Table I represents the taxonomic affiliation of the identifiable remains including

family, botanical name (genera/species), the common name. Only Juniperus spp. was recovered in both charred and unburned form. Four additional taxa were only recovered in charred form, and another four taxa were found only in unburned condition.

TABLE I
Identified Macrofossils from the Dead Raven Site

Family	Botanical Name	Common Name
ASTERACEAE	-Artemisia sp.	Sage
CHENOPODIACEAE	-Chenopodium sp.	Goosefoot
CUPRESSACEAE	*Juniperus spp.	Juniper
	-Juniperus osteosperma	Juniper
FABACEAE	+Phaseolus vulgaris	Bean
MALVACEAE	-Sphaeralcea sp.	Globemallow
PINACEAE	+Pinus edulis	Pinyon
POACEAE	+Zea mays	Corn
SOLANACEAE	+Physalis sp.	Groundcherry

*- Charred and Unburned

+ - Charred

- Unburned

Provenience and Frequency of Macrofossils and Micro-Refuse Recovered from the Dead Raven Site

TOTAL

Table II details the types, provenience, and frequency of all macro-fossils and micro-refuse recovered from the ten samples. In summary, the sample collected from sterile soil in the test trench was the only sample that did not produce remains. Further, the botanical materials recovered from the modern sample were not found in any of the samples taken from archeological contexts. At the same time, Zea mays was found in all archeological samples, Physalis sp. was recovered in two prehistoric samples, while the remaining taxa were extracted from single archeological soil samples. Bone was found in all feature samples as well as in the modern sample and lithic occurred in all samples except that from the exterior hearth. Ceramic fragments were recovered only in the midden and in the hearth of Pithouse 2.

The types, provenience, and frequency of the macrofossils found in the seven field specimen samples are listed in Table III. These samples were dominated by Phaseolus vulgaris (beans). The samples were collected from the floor of Pithouse 1 (FS-91), the roof fall of the workroom (FS-167). The small exterior cist (FS-263 and FS-264) contained 46 charred, spilt bean halves along with a large charred corn cob fragment. Eight Juniperus osteosperma charred nut fragments were recovered from Pithouse 1 hearth (FS-454).

TABLE III
The Provenience of the Field Specimen Macrofossils

	FS#	Phaseolus Vulgaris	Zea mays Cob fragment	Juniperus osteosperma Nut fragments
Pithouse #1 Floor Workroom	91	8		
Rooffall	136	9		
Cist #1 Floor Exterior Hearth	167	12		
#1	204	1		
Cist #2 Floor	263		1	
Cist #2 Floor Pithouse #1	264	46		
Hearth	454			8

DISCUSSION

The analysis of flotation samples taken from the Dead Raven site provides substantive data on Virgin Anasazi subsistence strategies and site formation processes. First, the subsistence strategy at the site appears to have focused on a narrow range of resources, most of which were domesticates. Flotation data from other Pueblo II sites at Quail Creek similarly indicated that a narrow range of resources was being exploited during the same period. Second, the micro-refuse recovered from the floors of the habitation structures seems to indicate various activities were taking place in the habitation rooms. Finally, the large proportion of charred remains recovered from structure interiors may indicate that at least part of the site burned prior to abandonment.

PRESERVATION AND SITE FORMATION PROCESSES

A sample from the modern surface (FS-32) and a sample from a sterile area within the trench (FS-31) were analyzed in order to compare the results with those obtained from feature samples. The purpose of the comparison was to assess preservation problems and post-abandonment disturbances. The sterile trench sample produced no remains while the modern sample contained only unburned fragments of Juniperus osteosperma nuts, Juniperus spp. terminal bud-scales, Artemisia sp. leaves, an unidentified seed, two small bones and nineteen small mammalian scats. Bone fragments were recovered from all the feature samples and one small mammalian scat was recovered from the floor of the larger exterior cist. No other correlations were observed between the control samples and the feature samples. This would suggest that post-abandonment disturbances were not a major factor in the site formation process, and that preservation problems were apparently minimal.

PLANT UTILIZATION AT THE DEAD RAVEN SITE

It is commonly assumed that only charred plant remains recovered from archeological sites should be considered cultural because so many nature factors can introduce plant remains into a site (Keepax 1977; Minnis 1981). With the exception of eighteen Chenopodium sp. seeds and one Sphaeralcea sp. Seed, no uncharred specimens were recovered from the upper midden strata. Neither of these taxa were found in charred form in any other feature. It is difficult to tell if the seeds are the product of prehistoric activity or if they simply represent seed rain. They should, however, not be discounted simply because they are unburned. The context and the distribution of items recovered is more important in site reconstruction than is a single criterion based on charred or unburned (see Heath 1986 for a discussion on interpreting charred and unburned macrofossils).

Both Chenopodium sp. seeds and Sphaeralcea sp. seeds are widely recovered from archeological sites. In most cases, Sphaeralcea sp. seeds (Globe Mallow) are recovered only in unburned form, and are found randomly in feature samples. Globe mallow is a prolific perennial plant of the Great Basin and the Desert Southwest which produces a low number of seeds per plant (Arnou, Albee and Wycoff 1980). Whiting (1939) reports that the Hopi occasionally used the roots as a medicinal drink and as face paint, but no ethnographic account refers to the use of the seeds. Also, it is inefficient to collect the seeds of perennial plants due to the low number of seeds produced per plant, particularly when the environment is dominated by annuals producing thousands of seeds. Even if the roots were collected by prehistoric people for some use, they would have to have been collected while the seeds were setting, and with the entire plant returned to the site, in order for the seeds to be represented. Such data would strongly suggest that the Sphaeralcea sp.

The Chenopodium sp. seeds recovered from this site, however, may or may not have been

a product of prehistoric activity. In general, Chenopodium sp. (Goosefoot) are not randomly recovered from sites but are, instead, found associated with specific features and are frequently recovered in both charred and unburned forms. A large quantity of goosefoot seeds were recovered, for example, from a sealed vessel at Nawthis Village (Heath n.d.), unequivocally indicating its use by the early inhabitants. The majority of Chenopodium sp. are annuals, producing thousands of seeds per plant (Arnold, Albee, and Wyckoff 1980), and are relatively easy to collect and process. Nearly, all ethnographic accounts of plant use by Native Americans mention goosefoot, with a variety of uses for the entire plant (see Heath 1987 for a summary of ethnographic uses). These data do not, of course, necessarily support the possibility that goosefoot was utilized at the Dead Raven site. The seeds were only found in unburned form, and were recovered only from the upper strata of the midden, the most likely place for post-abandonment disturbances to occur. The recovered Chenopodium sp. seeds will not, therefore, be incorporated into the subsistence interpretation for the site since direct relationship with the prehistoric occupants cannot be established.

By contrast, the domesticates Zea mays (corn) and Phaseolus vulgaris (beans) were both recovered from the site in charred condition only. Corn and beans would presumably represent a dietary item of the prehistoric population at the site regardless of whether they were charred, and regardless of what part of the plant was recovered. Although by-products of these plants can be used for non-dietary purposes (such as corn cob fuel, the stalks and husks for construction materials and vines for cordage) there is no ethnographic account of these taxa being grown solely for these purposes.

It is not unusual to find charred corn and bean remains at a site, but to find so many on the floors of structures suggests that at least some of the structures might have burned while in use. The Pithouse 2 floor sample produced seven corn cob fragments and one kernel. Four charred corn cob fragments were recovered from the midden sample, but because hearths are cleaned out from time to time, this is where one would expect to find charred items.

The floor of Pithouse 1 contained 23 corn cob fragments, three kernels and nine bean halves, while the hearth contained eight corn cob fragments. The large exterior cist had five corn cob fragments, four corn kernels and 12 bean halves, while the small adjacent cist contained 46 bean halves in floor context. The workroom hearth yielded 14 corn cob fragments, while the roof fall produced 9 bean halves.

Supporting the suggestion that at least some of the structure burned prior to abandonment is the fact that all other plant remains recovered within the structures were also charred. The other remains included Physalis sp. seeds, Juniperus sp. nut fragments, and a Pinus sp. cone fragment. Nine juniper nut fragments were recovered from the Pithouse 1 hearth. Ethnographic accounts report that berries were eaten, but generally in times of famine (Heath 1987). With the high representation of domesticates, it seems unlikely that prehistoric peoples were lacking other food. Presumably, the nuts were just a by-product of juniper being used as wood. The pine cone fragment recovered from the Pithouse 1 floor is also a likely by-product of the use of wood.

One charred Physalis sp. (Groundcherry) seed was recovered from the midden and four from the hearth of Pithouse 2. Groundcherry is a perennial plant which produces small tomato

fruits (Arnow, Albee, and Wycoff 1980). A wide range of ethnographic groups consumed the ripe fruits raw, boiled, and in meat stews (Casteller and Bell 1951; Russell 1902). It seems unlikely that the plant was exploited solely for its seeds. Inference can be made that the seeds were introduced into the site as a by-product of the fruit being eaten. The fact that they are only represented in the midden and the hearth suggests that they were not being stored in large quantities, but rather were being exploited only during the season of their maturity. The plant produces fruit continually from June to October and could have been collected any time during this period.

MICRO-REFUSE AND SPATIAL ORGANIZATION

The midden produced 32 pieces of micro-refuse including bone, lithics, and ceramics. None of these categories appeared to have been burned. The sherds were all recovered from the wet screened fraction and were relatively large. Two of the lithic fragments were also large, but the majority of the flakes and bones were microscopic. It seems unlikely that an activity area was situated in the middle of the midden. Presumably, the micro-refuse reflects cleaning techniques which cause very small items to become secondary refuse.

Only a few pieces of micro-refuse were recovered from the exterior hearth, the larger exterior cist, and Pithouse 2 floor and hearth. Although bones were recovered from the exterior hearth, none appeared burned suggesting the possibility that these represent post-abandonment disturbance. Two bone fragments, three lithic fragments and one small mammalian scat was recovered from the cist floor. The bones and lithic items were too small to determine if they were burned. The scat, however, was definitely not burned and is probably the result of rodent burrowing activities. The Pithouse 2 floor produced only one bone and four lithic fragments, while the hearth contained only four lithic pieces. All items were relatively large.

Pithouse 1 and the Work Room produced significantly more micro-refuse. The pithouse yielded 24 bones, seven lithic fragments and one shell fragment. At least two of the bones were charred, but the remaining bone was too small to determine whether or not they were burned. One of the lithic items was a large secondary flake, while the others were microscopic. The shell fragments were too small to identify. The work room hearth included seventeen bone fragments and eight lithic pieces. Some of the bones were definitely not burned indicating that some post-abandonment disturbances took place.

Although the sample size is small, the large number of micro-refuse items in Pithouse 1 and the Work Room suggests that a variety of activities were taking place indoors and may indicate that the structures were occupied in winter. Winter use appears to be supported by the presence of large, above-ground storage rooms. The macrofossil data suggest that the primary food supply came from domesticates which were processed in the fall and would have been stored throughout the winter. Storage rooms filled with food might have been left unguarded for short periods, but it is not likely that the contents of such structures would have been transported to other locations. Thus winter occupation is assumed.

It is also reasonable to assume that the site was occupied during the summer months. This is supported by the evidence of heavy reliance on domesticated plants, particularly Phaseolus vulgaris, (Carter 1945) which, at this elevation, would require irrigation during the growing season. Some of the population might be absent for some periods of time, but the site seems to qualify as one of permanent habitation.

COMPARISONS OF EARLY PUEBLO II SITES ON THE BASIS OF FLOTATION ANALYSIS

The Dead Raven site is in Johnson Canyon at an elevation of 5720 feet above sea level. It is located approximately 100 m west of Johnson Creek and below the White Cliffs. The site proper is located in a sandy area near the edge of a pinion/juniper community. The environmental setting is quite different from the Quail Creek sites, which are at a 3000 foot elevation and within a different vegetation zone. The Quail Creek Sites are, however, never more than 200 m from permanent water.

Flotatin analysis was conducted at 26 Quail Creek sites. Unfortunately, only the light fraction was analyzed (Heath 1986). Of these sites, only two were classified as early Pueblo II sites. Neither of these produced any flotation remains. The other two sites, classified as Pueblo II without further distinction produces only Zea mays (corn), Phaseolus Vulgaris (beans), and Nicotiana sp. (tobacco). Admitted the sample size is small, but it is interesting that the Pueblo II sites from Quail Creek contained the highest percentage of domesticates relative to the other time periods and that the Dead Raven site is also biased in favor of domesticated species.

IMPLICATIONS OF THE FLOTATION METHODS EMPLOYED

Until the advent of flotation techniques, the only botanical remains recovered from southwestern sites were generally large items such as corn, beans, squash, and nut fragments collected by alert excavators or during the screening process. When research interests shifted to a focus on subsistence strategies, there was need for a new recovery approach and flotation techniques became popular (see Watson 1976 for a historical discussion). The application of flotation methods created a new body of data reflecting a variety of wild resources found in archeological contexts. In one respect, this broadened the view of prehistoric subsistence strategies. Like all new techniques, however, flotation had its own set of problems. Prominent among these was the issue of how to interpret the data produced. This created a new line of research concerned with the processes responsible for seed contamination and how to distinguish between culturally and naturally deposited remains (see Ford 1978; 1979; Keepax 1977; Lopoint 1982; Minnius 1981). Such issues were of paramount concern and certainly require further research. In the present discussion, however, advances in the recovery technique will be addressed.

The general method of flotation is to stir a bulk soil sample into a bucket of water or a

flotation device and collect the light fraction, representing the portion of the matrix which floats (Struever 1968). This material will usually consist of charcoal, seeds, small bones, shell, and lighter plant matter. This technique certainly increases the data, but it only involves the recovery of items that float. This has the potential to increase a data bias when archeologists assume that they have recovered all the available data by using the method.

Much potential data is actually lost between processing the bulk soil sample and the recovery of the light fraction. First, the bulk soil sample is sifted through a geological sieve to break up the dirt clods and remove large items such as rocks, which would reduce the efficiency of the flotation equipment. The dry fraction, representing larger items which do not pass through the mesh, are usually discarded. This fraction will include both micro-refuse and larger botanical remains such as domesticates and nut fragments. Second, not all material floats. Larger, heavier items do not float and even smaller items can become trapped in the heavy fraction. Streuver (1986:361) realized this and stated that the heavy fraction should also be sorted. Unfortunately his comment is seldom acted upon.

In order to maximize the recovery of macrofossils and micro-refuse from prehistoric sites, archeologists should analyze all macrofossils observed during excavation. Food caches, processing areas and disposal areas may not necessarily be where flotation specimens occur. The data recovered from the Dead Raven site illustrates the potential of this method as shown in Table IV below.

It is apparent that the lowest number of items was recovered from the light fraction, while a single shell fragment was the only sample of micro-refuse recovered in the sample. Obviously nothing more than a tentative interpretation could have been offered on the basis of light fraction data along. By including the data recovered from the heavy fraction, however, there is a dramatic increase in corn remains along with the addition of bone and lithic materials. When the wet-screened items are incorporated, bean, cone fragments, nuts, ceramics, and small mammalian scats are added to the data base. Although the field specimen macrofossils did not add taxa, they did dramatically increase the recovery of beans, reflecting the importance of the resource in the diet.

TABLE IV

**Macrofossils and Micro-refuse recovered from the
Light Fraction, Heavy Fraction, Wet Screened Fraction and
Field Specimens**

Type	Light Fraction	Heavy Fraction	Wet Screened Fraction	Field Specimens
Zea mays, cobs	9	49	28	1
Zea mays, kernel		3	4	
Phaseolus vulgaris			1	76
Physalis sp.	4	1		
Sphaeralcea sp.		1		
Chenopodium sp.	18	4		
Artemisia sp.				
Pinus sp. cone				
Juniperus spp. nut			1	
Juniperus spp. budscales	10		3	8
Unidentifiable	1		1	
Bones		67	3	
Lithics		19	25	
Ceramics			17	
Scats			4	
Shell	1		20	
Total	43	144	107	85

Three other sites have also been analyzed in this fashion with quite similar results. The first application of this method came with the flotation samples from Nawthis Village (Heath n.d.), where over 50,000 macrofossils and 9,000 items of micro-refuse were collected. The greater portion of both macrofossils and micro-refuse were recovered from the heavy and dry fractions. In addition, 672 botanical remains were collected as field specimens, of which the majority were Zea mays cob fragments. Corn, beans, and squash were identified from the site, but only the corn was recovered from the light fraction. The distribution of micro-refuse items was significantly different between a large surface structure know as "Heartbreak Hotel," and the pithouses. Virtually no micro-refuse was found on the floors of the pithouses. While the bulk of the micro-refuse was found at Heartbreak Hotel, it was unevenly distributed between the rooms.

This method was then used on the flotation samples collected from the Wild Bill Knoll site (Heath and Metcalfe 1984), where 132 lithic fragments were recovered only from the heavy and dry fractions. Although the sample size was small, the micro-refuse brought into question the accepted wisdom that size sorting reflects primary and secondary refuse. It is generally assumed that small objects (i.e. micro-refuse) represent a primary depositional context. Many post-abandonment site formation processes can, however, redistribute these items and, more importantly, cleaning activities of the prehistoric inhabitants would presumably affect the distribution of smaller items. Hearths, for example, have to be periodically cleaned out, and the ash removed would not discriminate between large and small items (see Heath and Metcalfe 1984 for a discussion of micro-refuse and its implications to primary and secondary refuse).

This expanded flotation method was also used on 11 samples from the Orbit Inn site near Brigham City, Utah. The site is presently being excavated by Steven R. Simms of Weber State College. These samples produced thousands of bone and shell fragments, most of which were recovered from the heavy and dry fractions (Heath n.d.). Due to the high quantity of remains in specific areas, these remains do not seem to have been the result of extensive post-abandonment disturbance, but are, rather, thought to represent prehistoric cleaning activity. The completion of this research project should also shed light on the issues.

RECOMMENDATIONS

It is suggested that, in the future, flotation samples should be collected and analyzed from all sites excavated in the culture area. Particular attention should be given to temporal variation and elevational differences between highland and lowland sites. The light, heavy, and dry fractions should always be analyzed in order to maximize information on site formation processes, spatial organization, activity areas, the possibility of determining seasonal occupation and the importance of domesticates in the diet. Obviously, sound interpretations cannot be made by comparing only two sites and the interpretations presented above are made as tentative suggestions to be tested through future research.

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Appendix B

The Dead Raven Site

Collection Summary

Backhoe Trench 1 – Strata 1, 2, & 3 – 0-100 cm

Ceramics

North Creek Gray (15 fr., 1 sherd, 1 slip).....	107
St. George B/G (1 fr.).....	1
U/i Virgin Ser. B/G (3 fr.)	8
Shinarump Plain (9 fr., 1 slip, 74 vitr.).....	127
U/i Tusayan White	2

Lithics

Q – Edge grinder.....	1
LQ – Edge grinder	1
Q – Edge pounder	1
Q – Cobble scraper.....	1
C – Utilized flakes.....	9
C2 – Utilized flakes.....	3
C3 – Utilized flakes.....	3
C5 – Utilized flake	1
Q – Utilized flakes	2
C3 – Core	1
C – Biface flake (edge ground).....	1
C – Core flake (cortex).....	1
C2 – Core flake	1
C2 – Core shatter flake.....	1
C3 – Biface flake.....	1
C3 – Core flake (cortex).....	1
Q – Core flakes (2 cortex).....	2
Q – Core shatter flake (cortex).....	1
Q – U/i flake.....	1

Faunal

Artiodactyla metacarpal frag. (burned).....	1
Small mammal mandible frag. (burned).....	1
Small mammal spinal element (burned)	1
Lepus sp. right humerus	1
Lepus sp. left tibia frag.....	1
Lepus sp. ulna frag.	1
Large mammal tibia frag.....	1
Large mammal long bone frags.	6
Large mammal bone frags.	4
Small mammal humerus frag.	1
Long bone frag.	1

Backhoe Trench 2 – Strata 1, 2, & 3 – 0-75 cm.

Ceramics

North Creek Gray (9 fr., 1 slip).....	41
U/i Virgin Ser. B/G.....	8
Shinarump Plain (3 fr., 45 vitr.)	89
U/i Tusayan White	1

Lithics

D – Metate frag.	1
L – Abrading stone/grinding stone.....	1
C – Utilized Flakes.....	4
C3 – Utilized Flake	1

C4 – Utilized Flake	1
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Faunal

Large mammal ulna frag. (polished).....	1
Lepus sp. left pelvis frag.	1
Sylvilagus sp. right femur frag.....	1
Sylvilagus sp. left humerus	1
Sylvilagus sp. right tibia frag.	1
Large mammal long bone frag.....	1
Small mammal left humerus frag.....	1
Small mammal humerus frags.	2
Small mammal right scapula frag.	1
Small mammal long bone frag.....	1
Mammal rib frag.	1

Backhoe Trench 3 – Strata 1, 2, & 3 – 0-70 cm.

Ceramics

North Creek Gray	7
Hildale B/G	1
Shinarump Plain (10 vitr.).....	18

Lithics

C – Biface flake.....	1
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Backhoe Trench 4 – Strata 1, 2, & 3 – 0-70 cm.

Ceramics

North Creek Gray (1 fr.).....	38
St. George B/G	3
U/i Virgin Ser. B/G (3 fr., 1 slip).....	11
Shinarump Plain (35 vitr.).....	69
U/i Tusayan White	2

Lithics

S – Abrading stone	1
L – Modified stone	1
Q – Edge pounder	1
C3 – Rose Spring Corner-notched point.....	1
C – Point preform frag.	1
C3 – Utilized flakes.....	2
Q – Utilized flake	1
C – Biface flake.....	1
C – Core flake	1
C3 – U/i flake	1

Faunal

Sylvilagus sp. left mandible frag.....	1
Small mammal mandible frag.....	1
Long bone frags.	7
U/i bone frag.	1

Backhoe Trench 5 – Strata 1, 2, &3 – 0-110 cm.Ceramics

North Creek Gray (2 fr.).....	7
U/i Virgin Ser. B/G.....	1
Shinarump Plain (4 vitr.).....	4
Boulder Gray.....	1

Lithics

S – Mano frag.....	1
C – Utilized flake	1
Q – Core flake (cortex)	1

Faunal

Artiodactyla metacarpal frag.....	1
Small mammal long bone frag.....	1

Cist 1 – Fill – 20-60 cm.Ceramics

North Creek Gray (1 fr., 2 sherd).....	38
St. George B/G (3 fr.).....	4
U/i Virgin Ser. B/G.....	5
Shinarump Plain (14 fr., 1 slip, 64 vitr.).....	96
U/i Tusayan White	2

Lithics

Q – Mano frag.....	1
C2 – Biface	1
C – Utilized flake	1
C2 – Utilized flakes.....	2
C – Biface flakes	3
C – Core flake (cortex).....	1
C – U/i flake	1
C3 – U/i flake	1
C4 – Core flake	1
C5 – Core flake (cortex).....	1

Faunal

Artiodactyla metatarsal frag. (split, ground and burned).....	1
Large mammal long bone frags.	7
U/i bone.....	1

Cist 1 – Floor – 60-70 cm.Ceramics

North Creek Gray (2 fr.).....	13
U/i Virgin Ser. B/G.....	4
Shinarump Plain (11 vitr.).....	19

Lithics

C – Utilized flake	1
C – Core shatter flake (cortex).....	1

Faunal

Long bone frag. (burned).....	1
<i>Sylvilagus</i> sp. right tibia frag.	1
Long bone frags.	5

Cist 2 – Fill – 20-58 cm.Ceramics

North Creek Gray.....	31
U/i Virgin Ser. B/G.....	4
Moapa Red (abundant crushed olivine).....	4

Lithics

S – Metate frag.....	1
Q – Edge pounder	1
- Pendant frag.....	1
Azurite frags.....	3
C – Scraper/biface.....	1
C – Utilized flakes.....	11
C3 – Utilized flake	1
C4 – Utilized flake	1
Q – U/i flake (cortex).....	1

Faunal

Awl Type A. <i>Odocoileus hemionus</i> left metatarsal	1
Awl Type A. <i>Odocoileus hemionus</i> metacarpal	1
Awl Type A. <i>Odocoileus hemionus</i> metatarsal	1
Large mammal long bone frag. (burned)	1
Artiodactyla vertebra frag.....	1
Large mammal rib frag.	1

Cist 3 – Fill – 20-73 cm.Ceramics

North Creek Gray.....	26
U/i Virgin Ser. B/G (5 fr., 1 slip).....	6
Boulder Gray.....	1
U/i Moapa Ser. B/G.....	1
Shinarump Plain (1 fr., 26 vitr.)	49

Lithics

Q – Edge grinder.....	1
C – Utilized flakes.....	3
C – Biface flakes	2
C – Core flakes.....	2
C2 – Core flake (cortex).....	1
C3 – Biface flake.....	1
C3 – Core flake	1
Q – Core flakes (1 cortex).....	2
Q – Core shatter flake (cortex).....	1
Q – U/i flake.....	1

Faunal

Large mammal long bone frag. (burned)	1
Artiodactyla right radius frag.....	1
Small mammal long bone frag.....	1

Cist 4 – Fill – 20-35 cm.Ceramics

North Creek Gray.....	5
U/i Virgin Ser. B/G.....	2
Shinarump Plain (7 vitr.).....	13

Lithics

C – Utilized flake	1
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Faunal

<i>Sylvilagus</i> sp. right tibia.....	1
Small mammal rib frag.	1

Exterior Cist – Fill – 20-61 cm.Ceramics

North Creek Gray.....	2
Shinarump Plain (2 vitr.).....	9

Lithics

S – Metate frag.....	1
C2 – Scraper.....	1
C – Utilized flakes.....	3
C2 – Utilized flake	1
C4 – Core flake (cortex).....	1

Work Room – Stratum 2 & Roof Fall – 10-65 cm.

Ceramics

North Creek Gray (17 fr., 1 sherd).....	17
St. George B/G (2 fr.).....	2
U/i Virgin Ser. B/G.....	19
Shinarump Plain (7 fr., 55 vitr.)	138
Boulder Gray.....	1

Lithics

S – Metate frag.....	1
S – Mano frag.....	1
S – Abrading stone.....	1
Q – Polishing stone.....	1
Q – Polishing stone frag.....	1
Q – Edge grinder.....	1
C2 – Abajo point	1
C – Biface	1
C – Biface frag.....	1
C3 – Biface base frag.....	1
C3 – Biface frag.....	1
C3 – Drill	1
C – Utilized flakes.....	9
C2 – Utilized flakes.....	2
Q – Utilized flake	1
C – Biface flakes (2 edge ground).....	5
C – Core flakes.....	6
C – Core shatter flake.....	1
C – U/i flakes	3
C2 – Biface flake.....	1
C2 – Core flake	1
C3 – Biface flake.....	1
C4 – Core flakes.....	2
Q – Core flake	1
Q – U/i flake.....	1

Faunal

Awl Type A <i>Odocoileus hemionus</i> metatarsal.....	1
Awl tip Type A Artiodactyla.....	1
Artiodactyla rib frag. (scratches)	1
Artiodactyla rib frag. (diagonal striations).....	1
Artiodactyla rib frag. (striations, polished).....	1
Artiodactyla rib frags.	3
<i>Lepus</i> sp. right femur frag.....	1
<i>Lepus</i> sp. right scapula frag.	1
<i>Sylvilagus</i> sp. left humerus	1
<i>Sylvilagus</i> sp. right humerus	1
<i>Sylvilagus</i> sp. right tibia frag.	1
<i>Sylvilagus</i> sp. left ulna	1
<i>Sylvilagus</i> sp. right ulna	1
Large mammal metacarpal frag.	1
Large mammal long bone frag.....	1
Small mammal left ulna frag.....	1
Small mammal ulna frag.....	1
Small mammal metacarpal/tarsals	2
Small mammal long bone frags.	3
Small mammal bone frag.....	1
Long bone frag.....	1

Work Room – Floor – 64-80 cm.

Ceramics

North Creek Gray (1 slip)	17
U/i Virgin Ser. B/G.....	3
Shinarump Plain (7 vitr.).....	15

Lithics

S – Shaft smoother.....	1
Q – Edge pounders.....	2
C – Biface	1
C4 – Biface frag.....	1

Faunal

Awl Type A Artiodactyla metacarpal	1
Flesher Type C <i>Odocoileus hemionus</i> metatarsal	1

Cist D – Fill – 60-75 cm.

Ceramics

North Creek Gray.....	1
U/i Virgin Ser. B/G.....	2

Lithics

L – Disk.....	1
C – Utilized flake	1

Faunal

Tool frag. <i>Odocoileus hemionus</i> metatarsal.....	1
<i>Lepus</i> sp. right radius frag.....	1
<i>Lepus</i> sp. right ulna frag.....	1

Cist E – Fill – 20-60 cm.

Ceramics

Shinarump Plain (2 vitr.).....	2
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Faunal

Flesher Type C <i>Odocoileus hemionus</i> metatarsal	1
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Exterior Hearth 1 – Fill – 35-50 cm.

Ceramics

North Creek Gray.....	2
Shinarump Plain (5 vitr.).....	14

Lithics

Turquoise pendant frag.	1
C3 – Concave scraper	1

Faunal

Small mammal long bone frag. (burned)	1
<i>Lepus</i> sp. left scapula frag.....	1
Small mammal scapula frags.	3
Long bone frags.	3

Pithouse 1 – Stratum 2 – 0-40 cm.

Ceramics

North Creek Gray (21 fr.).....	209
St. George B/G (5 fr.).....	13
U/i Virgin Ser. B/G (4 fr.)	26
Shinarump Plain (2 fr., 116 vitr.)	245
Wygaret B/G	1
U/i Tusayan White	4
U/i San Juan Poly.....	1

Lithics

S – Metate	1
S – Mano	1
S – Mano/abrading stone	1
Q – Polishing stone frag.	1
Q – Edge grinders	3
L – Disk	1
L – Modified stone	1
S – Ground stone	2
S – Ground stone frag.	1
Q – Edge pounders	2
C – Point preform	1
C – Biface	1
C – Utilized flakes	8
C2 – Utilized flake	1
C3 – Utilized flakes	3
C4 – Utilized flake	1
Q – Utilized flakes	2
C – Core	1
C – Biface flakes (1 edge ground)	3
C – Core flakes (3 cortex)	4
C – Core shatter flake (cortex)	1
C – U/i flake	1
C2 – U/i flake	1
C3 – Core flakes	2
Q – Core flakes (5 cortex)	6
Q – U/i flake (cortex)	1

Faunal

Awl Type A Artiodactyla metacarpal	1
Awl Type B Large mammal bone	1
Large mammal long bone frag. (utilized)	1
Artiodactyla phalange (burned)	1
Small mammal long bone frag. (burned)	1
<i>Odocoileus hemionus</i> phalanges	2
Artiodactyla astralgus frag.	1
Artiodactyla rib frags.	5
Artiodactyla vertebra frags.	4
Artiodactyla long bone frags.	17
<i>Sylvilagus</i> sp. left femur frag.	1
<i>Sylvilagus</i> sp. right humerus	2
<i>Sylvilagus</i> sp. right tibia frags.	2
Large mammal long bone frags.	2
Medium mammal left humerus frag.	1
Small mammal rib frags.	3
Small mammal vertebra frag.	1
Small mammal long bone frags.	4
U/i bone frag.	1

Pithouse 1 – Fill – 20-100 cm.

Ceramics

North Creek Gray (10 fr.)	466
St. George B/G (7 fr.)	10
U/i Virgin Ser. B/G (33 fr., 5 slip)	73
Shinarump Plain (27 fr., 297 vitr.)	593
Boulder Gray	3
Black Mesa B/W	3
U/i Tusayan White (1 fr.)	1
U/i San Juan Poly	1

Lithics

S – Metate	1
S – Metate frags.	5
S – Slab metates	3
S – Slab metate frag.	1
S – Grinding platform frag.	1

S – Grinding slabs	2
S – Grinding slab frag.	1
S – Mano frags.	2
S – Abrading stone	1
L – Abrading stone	1
S – Hatch cover frag.	1
L – Disk frag.	1
S – Sphere	1
S – Modified Stone	1
Q – Core scraper	1
Q – Unfinished pipe	1
Azurite frag.	1
C – Parowan Basal-notched point	1
C – Abajo point	1
C – Biface	1
C2 – Biface base frag.	1
C3 – Biface base frags	2
C – Drill	1
C4 – Drill	1
C2 – Concave scraper	1
C – Bifacially worked flake	1
C – Utilized flakes	43
C2 – Utilized flakes	3
C3 – Utilized flakes	3
C4 – Utilized flake	1
C – Cores	2
C3 – Core	1
C – Biface flakes (5 edge ground)	16
C – Core flakes (5 cortex)	17
C – Core shatter flakes (2 cortex)	2
C – U/i flakes (2 cortex)	9
C2 – Core flakes (5 cortex)	10
C2 – U/i flakes (3 cortex)	5
C3 – Core flakes (5 cortex)	14
C3 – U/i flakes (1 cortex)	10
C4 – U/i flakes (1 cortex)	2
C5 – U/i flake	1
Q – Core flakes (3 cortex)	3
Q – Core shatter flake	1
Q – U/i flake (cortex)	1

Faunal

Worked shell	2
Worked and drilled shell	1
Awl Type A <i>Odocoileus hemionus</i> right metatarsal	1
Awl Type A <i>Odocoileus hemionus</i> metatarsal	1
Awl Type B Large mammal bone	1
Fleshers Type C <i>Odocoileus hemionus</i> metatarsal	2
Flesher Type D Artiodactyla long bone	1
Pins u/i bone	2
Whistle u/i bone	1
Antler and stone pounding tool	1
Antler scraper	1
<i>Odocoileus hemionus</i> right metatarsal frag. (cut marks)	1
Artiodactyla rib frag. (notched)	1
Artiodactyla long bone frag. (utilized)	1
Large mammal long bone frag. (wear and striations)	1
Artiodactyla long bone frag. (burned)	1
U/i vertebra frag. (burned)	1
<i>Odocoileus hemionus</i> right metatarsal frags.	1
Artiodactyla phalanges	5
Artiodactyla rib frags.	11
Artiodactyla vertebra frags.	11
<i>Lepus</i> sp. left femur frag.	1
<i>Lepus</i> sp. right femur frag.	1
<i>Lepus</i> sp. left humerus frag.	1
<i>Lepus</i> sp. right mandible frags.	3

<i>Lepus</i> sp. right pelvis frag.....	1
<i>Sylvilagus</i> sp. left femurs	3
<i>Sylvilagus</i> sp. right femurs	2
<i>Sylvilagus</i> sp. right femur frag.....	1
<i>Sylvilagus</i> sp. left humerus frags.	2
<i>Sylvilagus</i> sp. right humerus	1
<i>Sylvilagus</i> sp. right mandible frags.	2
<i>Sylvilagus</i> sp. left pelvis frags.....	5
<i>Sylvilagus</i> sp. right pelvis frags.	2
<i>Sylvilagus</i> sp. left radii.....	2
<i>Sylvilagus</i> sp. right radius frags.	4
<i>Sylvilagus</i> sp. left scapula frags	2
<i>Sylvilagus</i> sp. right scapula frags	2
<i>Sylvilagus</i> sp. skull frag.	1
<i>Sylvilagus</i> sp. left tibia.....	4
<i>Sylvilagus</i> sp. right tibia frags.....	2
<i>Sylvilagus</i> sp. left ulna frag.....	1
Large mammal long bone frags.	24
Large mammal bone frags.	2
Small/medium mammal left scapula frag.	1
Small mammal mandible frags.	2
Small mammal metapodials.....	5
Small mammal rib frags.	4
Small mammal scapula frags.	3
Small mammal phalange.....	1
Small mammal vertebra frags.	3
Small mammal long bone	1
Small mammal long bone frags.	24
Rib frags.....	3
U/i bones	26

Pithouse 1 – Undifferentiated Fill – 0-100 cm.

Ceramics

North Creek Gray (1 slip, 9fr.).....	60
St. George B/G (1 fr.).....	1
U/i Virgin Ser. B/G (3 fr.)	10
Shinarump Plain (6 fr., 45 vitr.)	101
Boulder Gray.....	5
U/i Tusayan White	4

Lithics

Q – Abrading stone	1
Q – Edge grinder.....	1
S – Sphere	1
L – Disk	1
S – Modified stone frag.....	1
L – Modified stone frags.	2
C – Abajo point.....	1
C – Utilized flakes.....	7
C2 – Utilized flakes.....	2
C3 – Utilized flake	1
C – Biface flakes (1 edge ground).....	2
C – Core flake	1
C2 – Core shatter flake.....	1
C3 – Biface flake.....	1
C4 – Core flake (cortex).....	1
Q – Core flakes (1 cortex).....	2
Q – Core shatter flake	1

Faunal

Flesher Type D Large mammal bone	1
Long bone frag. (polished).....	1
<i>Odocoileus hemionus</i> phalange.....	1
<i>Ovis Canadensis</i> left calcaneus.....	1
Artiodactyla phalange	1
Artiodactyla rib frag.....	1

<i>Lepus</i> sp. left femur frag.	1
<i>Lepus</i> sp. right femur frag.....	1
<i>Sylvilagus</i> sp. phalange	1
<i>Sylvilagus</i> sp. left pelvis frag.	1
<i>Sylvilagus</i> sp. right pelvis frag.	1
<i>Sylvilagus</i> sp. right tibia frag.	1
<i>Citellus variegates</i> left mandible frag.....	1
Rodentia tooth frag.	1
Large mammal skull frag.	1
Large mammal long bone frags.	5
Large mammal bone frag.	1
Small mammal right tibia frag.	1
Small mammal tibia frag.....	1
Small mammal vertebra frag.....	1
Small mammal long bone frags.	2
U/i bone frags.....	6

Pithouse 1 – Disturbed Fill – 0-110 cm.

Ceramics

North Creek Gray.....	115
St. George B/G (1 fr.).....	2
U/i Virgin Ser. B/G (2 fr.)	19
Boulder Gray.....	1
Shinarump Plain (12 fr., 1 slip, 130 vitr.).....	216
Dogoszhi B/G.....	1
U/i San Juan Red.....	1

Lithics

S – Mano	1
S – Abrading stone	1
Q – Abrading stone/hammerstone.....	1
Q – Polishing stones	2
Q – Edge grinder.....	1
S – Ground stone frags.....	3
C2 – Hammerstone	1
Q – Edge pounder	1
Q – Cobble core scraper.....	1
C – Bifacially retouched flake.....	1
C – Utilized flakes.....	8
C3 – Utilized flakes.....	3
C4 – Utilized flake	1
C – Biface flakes (2 edge ground).....	3
C – Core flakes.....	6
C – Core shatter flake (cortex)	1
C – U/i flakes	2
C2 – Core flakes (1 cortex)	4
C2 – U/i flake	1
C3 – Biface flake.....	1
C3 – Core flakes.....	5
C3 – U/i flakes	3
Q – Core flakes (3 cortex).....	5
Q – U/i flakes (2 cortex).....	3
CQ – Core flake	1

Faunal

Small mammal long bone frag. (cut mark)	1
Artiodactyla rib frag. (burned).....	1
Artiodactyla right metacarpal	1
Artiodactyla phalanges	2
Artiodactyla vertebra frags.	4
Artiodactyla long bone frags.....	5
<i>Lepus</i> sp. right scapula frag.	1
Large mammal scapula frags.	2
Small mammal metatarsal/carpal.....	1
Small mammal vertebra frag.....	1

Small mammal long bone frags.	2
U/i bone frags.	8

Pithouse 1 – Bench Fill/Surface – 40-75 cm.

Ceramics

North Creek Gray (2 fr.).....	35
U/i Virgin Ser. B/G (7 fr.)	11
Shinarump Plain (30 vitr.).....	56

Lithics

Q – Edge pounder	1
L – Ground stone frag.	1
C – Utilized flake	1
C4 – Utilized flake	1
C – Core	1
C2 – Core	1
C – Core flakes (1 cortex)	2
C2 – Biface flake.....	1
C4 – Core flake	1
Q – Core flakes.....	2

Faunal

<i>Ovis Canadensis</i> left metatarsal and phalange (cut marks and incised lines).....	1
Rib frag. (burned).....	1
Artiodactyla right humerus frag.....	1
Artiodactyla phalange frag.....	1
Artiodactyla long bone frags.....	2
<i>Lepus</i> sp. right pelvis	1
<i>Sylvilagus</i> sp. right humerus	1
<i>Sylvilagus</i> sp. right tibia frag.	1
<i>Neotoma</i> sp. skull frag.	1
<i>Sciurus</i> sp. right mandible frag.....	1
Large mammal long bone frags.	2
Small mammal rib frag.	1

Pithouse 1 – Fill 10 cm. above floor – 95-105 cm.

Ceramics

North Creek Gray (11 fr.).....	52
St. George B/G (2 fr.).....	4
U/i Virgin Ser. B/G	8
Shinarump Plain (1 fr., 48 vitr.)	65
U/i Tusayan White	10

Lithics

S – Mano frag.....	1
S – Abrading stones	2
L – Hatch cover.....	1
PW – Hammerstone	1
C – Utilized flakes.....	4
C3 – Utilized flake	1
C – U/i flake	1
C3 – Core flake	1
C3 – Core shatter flake.....	1
C3 – U/i flake.....	1

Faunal

Spatulate tool <i>Odocoileus hemionus</i> metatarsal	1
Artiodactyla phalange	1
Artiodactyla rib frag.....	1
<i>Lepus</i> sp. left pelvis frag.	1
<i>Lepus</i> sp. right pelvis frag.....	1
<i>Lepus</i> sp. left radius frag.....	1
<i>Lepus</i> sp. left scapula frag.....	1
<i>Sylvilagus</i> sp. right femur frags.	2

<i>Sylvilagus</i> sp. left pelvis frag.	1
<i>Sylvilagus</i> sp. left radius	1
<i>Sylvilagus</i> sp. right radius	1
<i>Sylvilagus</i> sp. ulna.....	1
<i>Cynomys</i> sp. left mandible frag.....	1
Small mammal phalange.....	1
Small mammal rib frag.	1
Small mammal long bone frags.	4
Rib frags.....	2

Pithouse 1 – Floor – 105-110 cm.

Ceramics

North Creek Gray (11 fr.).....	71
U/i Virgin Ser. B/G (2 fr.)	4
Shinarump Plain (19 vitr.).....	32

Lithics

S – Metate frag.....	1
S – Mano	1
S – Mano frag.	1
Q – Mano frag.	1
LS – Mano frag.	1
Q – Abrading stone	1
Q – Edge grinder.....	1
L – Hatch cover frags.	3
S – Ground stone frag.	1
Q – Edge pounders.....	2
C – Abajo points	2
C – Utilized flakes.....	3
C2 – Utilized flake	1
C4 – Utilized flake	1
C3 – Core	1
C – Biface flakes (1 edge ground).....	3
C – Core flake	1
C2 – Core flake (cortex).....	1
C3 – Core flake (cortex).....	1

Faunal

Flesher Type E <i>Odocoileus hemionus</i> metatarsal	1
Bone pendant	1
Bone gaming piece.....	1
Artiodactyla long bone frag.	1
<i>Lepus</i> sp. calcaneus.....	2
<i>Sylvilagus</i> sp. humerus frag.	1
<i>Sylvilagus</i> sp. left pelvis frag.	1
<i>Sylvilagus</i> sp. right pelvis frag.....	1
<i>Sylvilagus</i> sp. right scapula frag.....	1
Small mammal rib.....	1
Small mammal long bone	1

Pithouse 1 – Hearth Fill – 105-129 cm.

Ceramics

North Creek Gray (11 fr.).....	83
U/i Virgin Ser. B/G	5
Shinarump Plain (19 vitr.).....	33

Lithics

C – Utilized flakes.....	3
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Pithouse 1 – Basin 2 Fill – 110-129 cm.

Ceramics

North Creek Gray.....	1
Shinarump Plain (1 vitr.).....	3

Lithics

C – Core flake1

Faunal

Artiodactyla long bone frag.1

Sylvilagus sp. left radius1

Sylvilagus sp. left radius frag1

Pithouse 2 – Stratum 2 – 0-70 cm.

Ceramics

North Creek Gray (3 fr.).....53

U/i Virgin Ser. B/G (1 fr.)9

Shinarump Plain (1 fr., 35 vitr.)57

Lithics

S – Ground stone frag.1

C3 – Point base1

C4 – Biface base frag.1

C – Utilized flakes.....2

C3 – Utilized flake1

C – Biface flake (edge ground)1

C2 – Core shatter flake (cortex)1

Q – Core flake (cortex)1

Faunal

Ovis Canadensis right scapula1

Pithouse 2 – Fill 2 – 110-147 cm.

Ceramics

North Creek Gray (2 fr.).....28

U/i Virgin Ser. B/G (2 fr.)4

Shinarump Plain (1 fr., 25 vitr.)44

U/i Tusayan White1

Lithics

Q – Abrading stone1

C – Eastgate Expanding stem point1

C3 – Utilized flake1

C3 – Core flake1

Faunal

Small mammal long bone frag. (burned)1

Artiodactyla long bone frag.1

Sylvilagus sp. right mandible frag.....1

Sylvilagus sp. right scapula frag.....1

Small mammal long bone frag.1

U/i long bone frag.1

Pithouse 2 – Roof Fall – 110-145 cm.

Ceramics

North Creek Gray (7 fr.).....46

U/i Virgin Ser. B/G (6 fr.)11

Shinarump Plain (2 fr., 62 vitr.)114

U/i Shinarump B/G1

U/i Tusayan White1

Lithics

Q – Polishing stone1

Q – Edge grinder/scrapper1

S – Sphere1

Q – Edge pounder1

C – Utilized flakes.....4

C2 – Utilized flake1

C3 – Utilized flake1

C4 – Utilized flake1

Q – Utilized flake1

C – Biface flakes2

C – Core flakes2

C – U/i flake (cortex)1

C2 – Core flake1

C2 – U/i flake1

C3 – Core flake (cortex).....1

C4 – Core flake (cortex).....1

Faunal

Tool *Odocoileus hemionus* left metatarsal frag.1

Artiodactyla right metacarpal (incised line)1

Artiodactyla metatarsal frag. (prepared to split).....1

Artiodactyla rib frag. (diagonal striations).....1

Artiodactyla rib frag. (polished)1

U/i bone (incised lines)1

Ovis Canadensis right tibia.....1

Artiodactyla long bone frags.....9

Lepus sp. left tibia frag.....1

Sylvilagus sp. left pelvis frags.....2

Sylvilagus sp. right pelvis frag.1

Sylvilagus sp. skull frag.1

Sylvilagus sp. right tibia frag.1

Large mammal bone frags.2

Small mammal long bone frags.2

Pithouse 2 – Undifferentiated Fill – 0-147 cm.

Ceramics

North Creek Gray (3 fr.).....30

St. George B/G (2 fr.).....2

U/i Virgin Ser. B/G.....7

Shinarump Plain (2 fr., 32 vitr.)50

U/i Tusayan White1

Lithics

S – Metate frag.1

S – Grinding slab1

S – Grinding slab frag.1

S – Abrading platform.....1

L – Ground stone frag.1

Q – Cobble scraper.....1

C – Utilized flakes.....2

C3 – Utilized flake1

C – Core flake1

C2 – Biface flake (edge ground)1

C3 – Core flake (cortex).....1

Q – Core flake1

Q – Core shatter flake1

Faunal

Artiodactyla metatarsal frags. (incised lines).....2

Long bone frag. (modified)1

Odocoileus hemionus right metatarsal frag.....1

Artiodactyla right metatarsal frag.1

Artiodactyla phalange1

Artiodactyla vertebra frags.2

Artiodactyla long bone frags.....12

Sylvilagus sp. left pelvis frag.1

Sylvilagus sp. right scapula frag.....1

Large mammal rib frag.1

Large mammal bone frag.1

U/i bone frags.....3

Pithouse 2 – Vent Shaft Fill – 0-147 cm.

Ceramics

Shinarump Plain (3 vitr.).....5

Lithics

S – Mano.....1
S – Ground stone frag.1

Faunal

Flesher Type E *Odocoileus hemionus* metatarsal1
Artiodactyla rib frag. (cut marks)1
Artiodactyla humerus frag.1
Sylvilagus sp. right pelvis frag.1

Pithouse 2 – Antechamber Fill – 0-55 cm.

Ceramics

North Creek Gray.....16
St. George B/G.....1
Shinarump Plain (10 vitr.).....16

Lithics

Q – Utilized flake.....1
C – Core.....1

Faunal

Large mammal long bone frag. (utilized)1
Odocoileus hemionus left tibia.....1
Artiodactyla metatarsal frag.1
Artiodactyla long bone frag.1
Long bone frags.1

Pithouse 2 – Bench Surface – 105-110 cm.

Ceramics

North Creek Gray.....1
Shinarump Plain (2 vitr.).....2

Faunal

Flesher Type C Artiodactyla metacarpal1

Pithouse 2 – Hearth Fill – 150-181 cm.

Ceramics

North Creek Gray.....4
U/i Virgin Ser. B/G (2 fr.)5
Shinarump Plain (4 vitr.).....4

Exterior Hearth 2 – Fill - 40-68 cm.

Ceramics

North Creek Gray.....1
Shinarump Plain (4 vitr.).....6

Lithics

C – Biface flakes (1 edge ground).....3
C – Core flake (cortex).....1
C – U/i flakes2
C2 – Biface flakes (1 edge ground).....2
C3 – Biface flake.....1
C3 – U/i flake1
C4 – U/i flake1

Faunal

Artiodactyla scapula frag.1
Sylvilagus calcaneus sp.1
Large mammal long bone frags.3

Exterior Hearth 2 – Use Area – 40-45 cm.

Ceramics

North Creek Gray.....17
U/i Virgin Ser. B/G (2 fr.)3
Shinarump Plain (18 vitr.).....35
U/i Tusayan White4

Lithics

Q – Abrading stone/edge grinder1
C – Bifacially worked tool.....1
C – Biface flake.....1
Q – Core flakes (3 cortex).....3

Faunal

Tool frag. *Odocoileus hemionus* metatarsal1
Large mammal bone frag. (cut marks, burned).....1
Artiodactyla vertebra frags.9
Large mammal rib frag.1
U/i bone frags.....10

Stratum 2 – West of Road – 10-40 cm.

Ceramics

Mesquite Gray.....1
North Creek Gray (7 fr., 2 slip).....252
U/i Virgin Ser. B/G (3 fr., 2 slip).....16
Boulder Gray.....1
Shinarump Plain (116 vitr.).....224
U/i Tusayan White (2 fr.)2
U/i San Juan Red.....1

Lithics

L – Slab metate/abrading stone1
S – Mano1
Q – Mano/abrading stone.....1
Q – Edge grinders2
S – Ground stone frag.1
Q – Edge pounders2
Azurite/obsidian frag.1
C2 – Elko Corner-notched point.....1
C2 – Biface frag.1
C – Bifacially modified frag.1
C2 – Drill frag.1
C – Utilized flakes.....18
C2 – Utilized flake1
C3 – Utilized flakes.....4
Q – Utilized flakes3
C – Biface flakes4
C – Core flakes (1 cortex)8
C – Core shatter flakes (2 cortex)2
C – Core shatter flakes (2 cortex)2
C – U/i flakes2
C2 – Biface flakes (4 edge ground).....4
C2 – Core flakes (1 cortex)3
C3 – Biface flake.....1
C3 – Core flakes (3 cortex)6
C3 – U/i flakes5
C4 – Biface flake.....1
C4 – U/i flake (cortex)1
Q – Biface flake (cortex).....1
Q – Core flakes (7 cortex).....10

Q – U/i flakes	3
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Faunal

Scapula frag. (incised lines).....	1
Large mammal long bone (modified, burned)	1
Large mammal phalange (burned).....	1
<i>Odocoileus hemionus</i> left humerus frags.....	2
<i>Odocoileus hemionus</i> left ulna.....	1
Artiodactyla rib frags.	3
Artiodactyla vertebra frags.	3
<i>Sylvilagus</i> sp. left pelvis frag.	1
Large mammal long bone frags.	11
Large mammal bone frags.	7
Small mammal mandible frag.....	1
Small mammal pelvis frag.	1
Small mammal long bone frag.....	1
U/i bone frags.....	13

Stratum 2 – East of Road – 10-40 cm.

Ceramics

North Creek Gray (6 fr.).....	67
St. George B/G.....	1
U/i Virgin Ser. B/G (5 fr.)	13
Shinarump Plain (75 vitr.).....	95
U/i San Juan B/R.....	1

Lithics

L – Grinding platform.....	1
S – Disk.....	1
S – Ground stone frag.	1
Q – Edge pounder	1
C3 – Utilized flake	1
C – Biface flakes.....	3
C – U/i flake.....	1
C2 – Core flakes (2 cortex).....	2
C3 – Biface flake.....	1
C3 – Core flake	1
C4 – Biface flake.....	1
C4 – Core flake	1

Faunal

Small mammal long bone frags. (burned).....	2
Large mammal scapula frag.....	1
Large mammal long bone frag.....	1

Stratum 2 – West of Road – 0-20 cm.

Ceramics

North Creek Gray (5 fr.).....	33
U/i Virgin Ser. B/G (3 fr.)	8
Shinarump Plain (39 vitr.)	67
U/i Tusayan White	1

Lithics

S – Abrading stone.....	1
S – Modified stone	1
Q – Edge pounder	1
C3 – Biface base frag.....	1
C3 – Utilized flake	1
C – Biface flake.....	1
C – Core flake	1
C – Core shatter flake (cortex).....	1

Stratum 3 – East of Road – 0-20 cm.

Ceramics

North Creek Gray (10 fr.).....	133
St. George B/G (1 fr.).....	2
U/i Virgin Ser. B/G (6 fr.)	14
Shinarump Plain (4 fr., 1 slip, 93 vitr.).....	145
U/i Tusayan White	4

Lithics

S – Mano frag.....	1
B – Mano frag.	1
Q – Edge pounders.....	3
C4 – Bifacially modified flake	1
C – Utilized flakes.....	11
C2 – Utilized flake	1
C4 – Utilized flakes.....	2
Q – Utilized flakes	4
C – Biface flakes	2
C – Core flake (cortex).....	1
C – U/i flake (cortex)	1
C2 – Core flakes (2 cortex)	2
C3 – Biface flake (edge ground).....	1
C3 – Core flakes.....	4
C4 – Biface flake.....	1
C4 – Core flakes (2 cortex)	2
Q – Core flakes (2 cortex).....	5
Q – U/i flake.....	1

Faunal

<i>Odocoileus hemionus</i> right metacarpal (burned).....	1
Artiodactyla right metatarsal frags.....	2
Artiodactyla scapula frag.....	1
Artiodactyla vertebra frags	4
Artiodactyla long bone frags.....	6
<i>Sylvilagus</i> sp. right scapula frag.....	1
Large mammal long bone frag.....	1
Long bone frags.	4

Surface

North Creek Gray.....	13
U/i Virgin Ser. B/G.....	3
Shinarump Plain (14 vitr.).....	26

Lithics

C – Utilized flake	1
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No Provenience

Ceramics

U/i Virgin Ser. B/G.....	1
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Lithics

L – Slab metate	1
Q – Mano frag.....	1
S – Abrading stone	1
L – Hatch cover.....	1
C – Utilized flake	1

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